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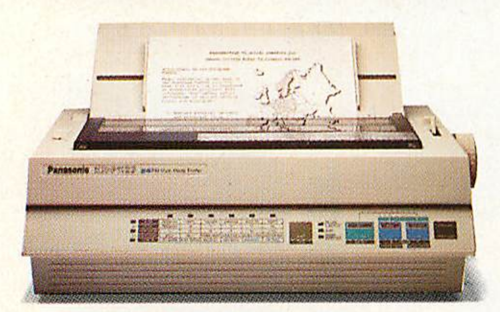
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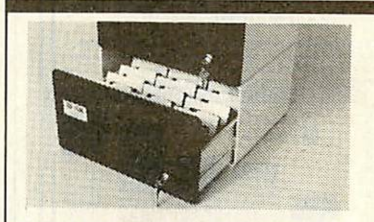
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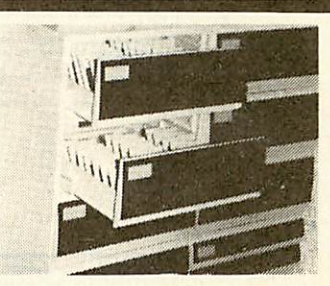
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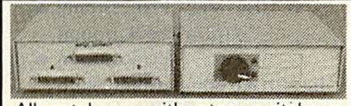
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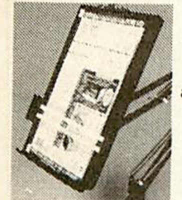
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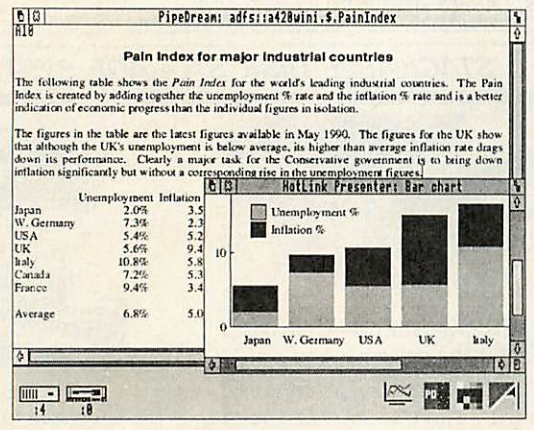
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The bar chart in the screen shown above was produced by using the HotLink between PipeDream 3 and HotLink Presenter.

Major features include:

- intuitive RISC OS user interface
- many documents loaded at once
- display and printing of pictures within text
- wysiwyg display including all RISC OS fonts
- built-in 93,003 word spelling checker
- file compatibility with PC & Z88 PipeDream & BBC View Professional
- natural, background recalculation
- keystroke compatibility with Z88 & PC PipeDream
- Z88 filing system
- automatic loading of VIEW, ViewSheet, Lotus, First Word Plus, Tab and CSV files
- automatic saving of VIEW, Lotus, Tab, CSV and Acorn DTP format files
- multi-field sorting
- 62 spreadsheet and database functions
- external references between documents for 3-D modelling
- macro file recorder
- slot protection

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PipeDream 3 breaks down the barriers between word processor, spreadsheet and database. With PipeDream 3, you can include numerical tables in your letters and reports, add paragraphs to your spreadsheets, and perform calculations within your databases.

PipeDream 3 has been written to take full advantage of RISC OS – if you can use RISC OS, you can use PipeDream 3. It is fully multi-tasking and multi-windowing, so you can work on many documents at once and instantly move information between them. PipeDream 3 can automatically load and save most popular file formats and is the first program to use the new RISC OS HotLink, which enables it to interact dynamically with Archimedes graphics programs, such as *HotLink Presenter* from Lingenuity and *GraphBox* from Minerva.

As well as winning the 1989/90 BBC Acorn User Award for Best 32-bit Business Software, PipeDream 3 was runner-up in the Best 32-bit Educational Software and Best 32-bit DTP/Word Processor categories.

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PipeDream 3 costs £147.00 + VAT.

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BBC ACORN USER

MARCH 1991 ISSUE No 104

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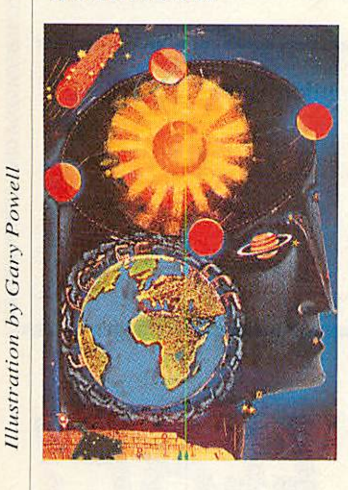
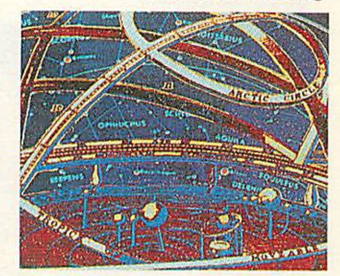


Illustration by Gary Powell

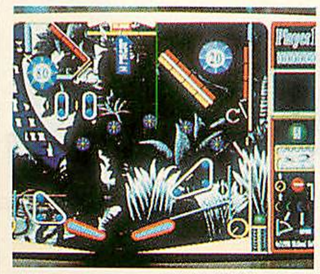
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BRANCHING OUT



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ART REVOLUTION

It's a *Revelation!* After two years' development, Longman Logotron's 'state of the art' package for the Archimedes has arrived.

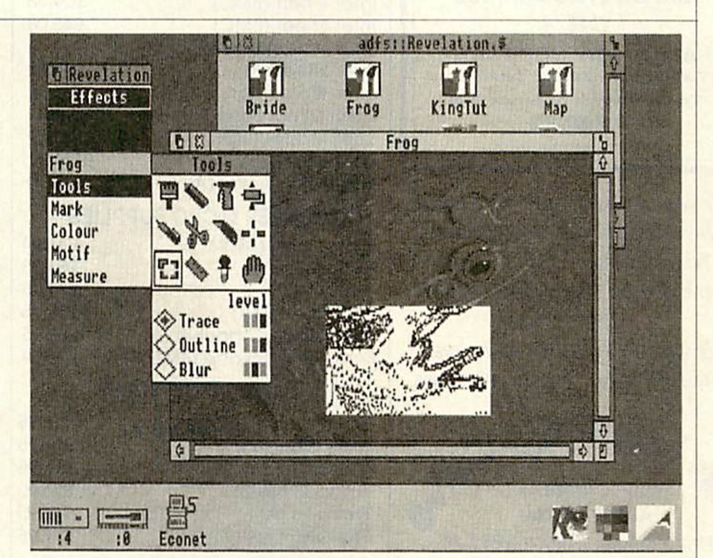
Designed to operate in any mode – including the forthcoming Risc OS 3 modes according to the press release! – the new package has a complete set of painting tools needed to create and edit bit-mapped images (sprites).

Art educators from over 80 UK schools, as well as over a dozen visual communication professionals, have been involved in the design and trials of *Revelation*. In some trials, high resolution images as large as 12Mb each were produced on the new Archimedes A540.

However, Longman Logotron is anxious to point out that the package has been designed for use on a basic (1Mb) machine. Obviously, when producing images with 256 colours, the more memory *Revelation* has to work with, the better.

Using the package you can:

- Carry out multiple image editing in Risc OS
- Use special tear-off sticky menus in easy mode
- Create a transparency mask and overlay pictures
- Cut and paste parts of one image into another and rotate, scale, bend, etc
- Introduce special effects, blend colours and washes
- Create 'motifs' from parts of an image and produce patterning and dithering effects



- Use slider controls to the colour and tint, to produce negatives and adjust colour strength and contrast
- Turn drawfiles into sprites for processing using the *Revelation Xtra* utility

Revelation is available now and costs £54 until March 31 1991 and £76 thereafter. For further details contact: Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. Tel: (0223) 323656.

100,000 AND COUNTING...

Acorn has sold its 100,000th Risc-based machine and has released independent market research which indicates that the BBC A3000 is the biggest-selling computer in schools and the fourth most popular computer across all markets (see the Education column on page 15 for more details).

Research Machines remains Acorn's biggest competitor in the education market, while Commodore is said to have approached a software house with a view to producing an Archimedes emulator for the Amiga. Apple has also recently launched a new low cost Macintosh aimed at the education market and has formed Arm Ltd with Acorn to advance its chip design and manufacturing ability.

Acorn made a special presentation at the recent BETT '91 show to mark the 100,000th Archimedes computer sold.

A BBC A3000 system was presented to Jeff Bale and Rick Back from the special needs department of West Bridgford School in Nottingham by Acorn managing director, Sam Wauchope (below, on far left).

For further information, contact Acorn Computers Ltd, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.



READING THE RIGHT ACT

The Reading Writing Course from LCL could help motivate disinterested or special needs children to read and write.

Using animated graphics, a voice/music tape and accompanying books, the course – designed for the BBC B, Master and Compact – is aimed at improving concentration, to enable pupils to reach attainment targets 1 to 5.

The 24 programs are suitable for children of all ages from three years on and can be adapted by teachers to suit individual teaching methods. The course is priced at £24. For further information contact: LCL, Thames House, 73 Blandy Road, Henley-on-Thames, Oxon RG9 1QB. Tel: (0491) 579345.



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ARC FIXES IT FOR JIM'S ROBOTIC CHAIR

Viewers of BBC TV's *Jim'll Fix It* may be intrigued by the new high-tech chair that host Jimmy Saville sits in. This flashy piece of robotic furniture is driven by nothing less than an Archimedes A440.

The idea of building a new chair for Jim came about during his recent visit to Reading University's department of cybernetics, where he was presented with an honorary fellowship in recognition of the work he does for disabled people.

Jim's old chair was thrown out by the BBC five years ago, and it was decided that a new high-tech chair should be created for the latest series.

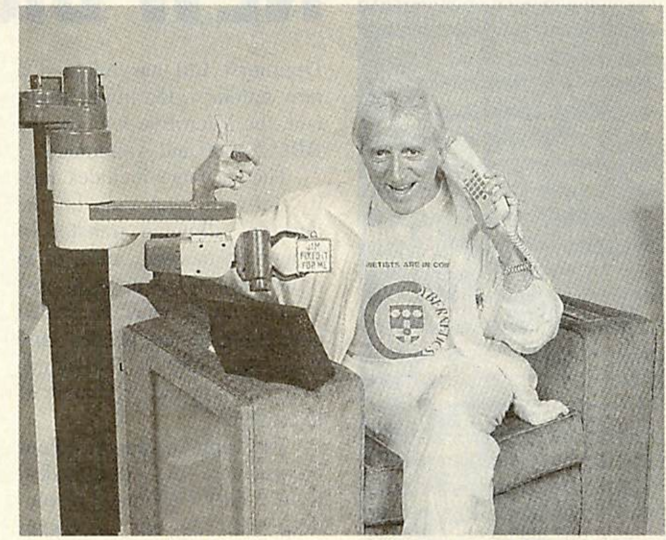
The brief for the chair, from the BBC, was very open and some of the features suggested included a cigar box, a badge-holding arm, a tea-making machine and a TV monitor.

It soon became clear to John Walsh and his team at Reading University that a computer would be needed inside the chair, with a good graphical display, possibilities for sound sampling and video digitising, and the ability to run control software for the robotic arm.

An Archimedes A440 was donated by Acorn, but extra items were needed. Clare's *Armadeus* sound sampling package provided such good quality that the BBC engineers apparently had to alter the output to make it sound mechanical.

Wild Vision's ADC1208 I/0 board provided an eight-bit digital output port, used to control the air pistons through an interface, which can switch two 24-volt supplies and one mains supply to control the teasmade. The company supplied a colour video digitiser to relay an external TV picture to the Hitachi LCD screen on the chair.

The robot is controlled through the Arc's RS232 link. All the software was written in Basic (adapted to work in Risc OS) and is multi-tasking for all the control functions.



Using the mouse, Jim can select from icons for a badge, a cup of tea, the draw section, a mystery item (used to bring up a video cassette) and a cigar.

Swift Upholstery designed (with the help of Reading), built and upholstered the chair for around £2000. In fact, the company built two – one is a spare in case Jim fails to fix it!

For further details, contact: John Walsh, Department of Cybernetics, Reading University, Whiteknights, PO Box 220, Reading, Berks RG6 2AX.

IOTA AIMING TO BE NUMBER ONE

Iota is a new Cambridge-based company which 'plans to be Acorn's number one software house by the end of 1992'.

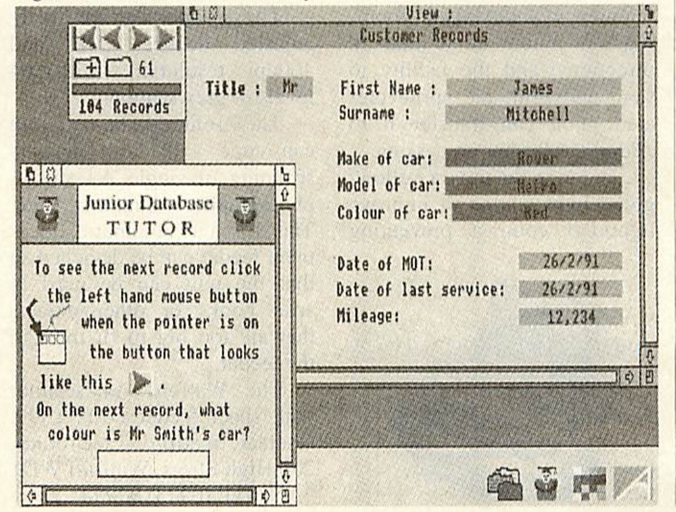
This ambitious claim is made by Iota's founder and marketing manager, Adrian Critchlow, who has recently left Acorn's consumer marketing department to set up the new company, which will be releasing *Junior Database* and *Touch Type* for the A3000/Arc this month.

Junior Database is a comprehensive, yet easy to use, database which can be used for all subjects in the National Curriculum. Apart from its ability to produce graphs from data, a unique 'hot linked' tutor is included to take users through the program, so there is no need to plough through a manual.

Touch Type is designed as a complete desktop typing tutor. It offers over 30 exercises, with instructions on how to use all your fingers, with screen guidance to ensure you don't need to look down at the keyboard. A separate window gives details of typing speed, which fingers need more practice, and so on. Sound effects include a voice which calls out letters.

The program has been designed so that it can be used by people with sight difficulties.

Junior Database costs £60.95 (£45.95 for educational establishments) and *Touch Type* costs £39.95. For further information, contact: Adrian Critchlow, Iota, St John's Innovation Centre, Cowley Road, Cambridge CB4 4WS. Tel: (0223) 421542.



TECHNOLOGY DATABASE

The *Technology Database* might prove useful for teachers planning lessons around the National Curriculum.

Developed by Loughborough In-Service Technology (LIST), it consists of two discs on Design and Technology and Information Technology. As many teachers have little computer experience, ease of use was vital – it is menu-driven with full printer support. There are versions for BBC B and Master computers, at £13.80, and £14.95 for the Archimedes.

LIST is also running an Inset initiative in IT for teachers covering all applications relevant to the Technology Orders.

More information from: The LIST Project, Department of Design and Technology, University of Technology, Loughborough, Leics LE11 3TU. Tel: (0509) 222661.

NEWS IN BRIEF

● The Starlight Foundation was formed to help make youngster's wishes come true. One young man – Victor, age 6 – who suffers from leukemia, has wished for a BBC B computer and printer to work on at home. If anyone would like to help him, contact Cheryl Nelson on 071-224 0506.

● A new Arc TV and video adaptor will give both UHF output for connection of a standard TV set, and composite video for direct connection of a video recorder. It allows a cheap upgrade from monochrome systems to colour. The adaptor costs £79 from: Vine Micros Ltd, 47-48 Hawley Square, Margate, Kent. Tel: (0843) 296237.

● Worried about the 'Extend' virus? If so, Hung Computer Services' Extend virus killer is available on its public domain software. *!VKiller* detects the virus and kills it. For further details contact Richard Cheung at Hung Computer Services Ltd, 82 Roe Lane, Kingsbury, London NW9 9BD. Tel: 081-206 2324.

● Cryptography is the creation of secret codes by which to pass confidential information. *The Public Key* is a new magazine which provides an Archimedes program for public key cryptography.

This will create the 'public' and 'private' keys necessary for safe message transmission. Copies of the magazine and disc cost £1 from: *The Public Key*, Waterfall, Uvedale Road, Oxted, Surrey RH8 0EW. Tel: (0883) 712440.

● Don't miss the Cambridge International Software Spring Fair. It's on March 7-10 at 8 Herbrand Street (nr Russell Square tube), London WC1. Tel: CIS on 071-833 4023.

NEW DIGITISER

Digithurst Ltd has released a new colour video image digitiser, the MicroEye 1A, for the BBC A3000 and Archimedes.

The package includes utility software that runs on the desktop, allowing transfer of images to memory, disc, or to other Archimedes applications.

The image may be scaled and cropped as needed and there are controls for saturation, contrast and brightness of the image.

The unit captures colour images into the Archimedes' Ram at 640 × 256 pixel resolution, with 24 bits of colour information per pixel. The full data is available to image processing applications, but in sprite form the images are reduced to 12 bits per pixel, giving an effective palette of 4096 colours. In this form, images are easily transferred to other Arc sprite-editing applications, such as *!Paint*.

Software supplied with MicroEye 1A includes a



library of Risc OS SWI routines which allow you to incorporate MicroEye's image capture into your own programs and applications.

Two versions of MicroEye 1A are available: for the Archimedes, a plug-in board with a back panel that carries an RGB/video connector; for the A3000, the board is supplied mounted in a separate external box which plugs into the expansion connector on the back of the machine. Either version needs a computer with at least 2Mb of Ram.

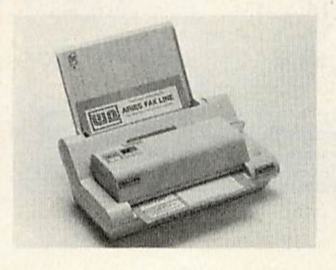
MicroEye 1A costs £569. Contact Digithurst Ltd, Newark Close, Royston, Herts SG8 5HL. Tel: (0763) 242955.

ARIES A4 SCANNER

Watford Electronics has just released an A4 scanner for the Archimedes and BBC A3000.

It's supplied with Rom-based podule software, and features include image zooming, inversion in X and Y directions, and the facility to save and print the sprite created. You can transfer it to *!Paint* for further processing.

The scanner uses a yellow/green light source to improve light/dark contrast, preventing



red colours from showing as white on the scanned image. You can also adjust the shading and brightness controls to get the best possible clarity.

The scanner can be freely adjusted between 100 and 400dpi resolution, with 64 levels of grey scaling.

The 216mm scanning width can cope with both desktop scanning of single A4 sheets, photographs, diagrams, etc. The 10-page automatic document feeder can be detached so that the unit can be used to scan books or other objects that are too big to fit through the feeder.

The Watford A4 scanner with sheet feeder costs £399. Contact Watford Electronics, 250 High Street, Watford WD1 2AN. Tel: (0923) 37774.

CREATIVE DESIGNS

Alpine Software has released a package designed to open up arcade game creation to a wider audience.

Called *Creator*, the new package is a fully Risc OS compliant multi-tasking application incorporating an object designer, screen designer, flight path designer and event manager for writing games.

In object designer mode, sprites are designed in *!Paint* or any other suitable package and loaded into the *Creator* sprite window. The path designer can be used to animate the sprites.

Screens of any complexity can be designed using the screen designer and each background sprite can be allocated to one of eight different layers.

The event manager is the key to controlling the game. As the game runs, a number of events are automatically generated. Typical events occur when two objects collide, when an object hits the edge of the screen, and so on.

Creator is expected to cost around £38. Details from: Alpine Software, PO Box 25, Portadown, Craigavon BT63 5UT. Tel: (0762) 342510.

WINDOW GAZING

A Sheffield teacher and his son have developed two programs to introduce Risc OS windows to children. Phil Porter's *Infant Windows* and *Junior Windows* help young users to become familiar with the mouse, moving objects around the screen and manoeuvring windows.

Even infants can compose pages of graphics and text and the packages support the National Curriculum. *Infant Windows* is priced at £15, with the *Junior* version at £20. They can be bought together for £30.

Contact: Porter's Primary Software, 138A Harvey Clough Road, Sheffield.

ARCHIMEDES

A3000 PRODUCTS

Monitor stand (A3K1) Probably the best monitor plinth available for the A3000 & the basis of a modular system. £24.95

System housing (A3K2) When you are ready to expand the A3000 this system housing isadded, allowing upto 2 floppy drives and a hard drive to be added. £69.50

Expansion card case (A3K3) If you are adding an expansion card ('podule') to an A3000, such asa hard disc card, then you will need this podule case to connect & protect the card. £14.95

Disc buffer (A3K6) If an extra floppy drive/s is to be connected then you will requirea disc buffer. This one supports upto 3 additional drives and incorporates software control for physical to logical drive mapping & 40/80 stepping which could prove essential when using discs in 65Host or PC emulator. A key feature isthe built in expansion for further cards to be added internally; also see A3K12. *NB some cheaper products may only provide connection for an additional drive without buffering.* £48.95

20mb hard disc (A3K7) A 20 mb hard disc drive ready to fit in A3K2, including the hard disc card and all cabling. We are not aware of any other hard disc upgrade that is treated as an internal upgrade (consult your Acorn dealer or call PRES for details) £399

NEW 40 MB HARD DISC (A3K14) AS A3K7 BUT TWICE THE CAPACITY. £499

3½" additional floppy drive (A3K8) 3½" disc drive & mounting brackets for A3K2. £75

5¼" additional floppy drive (A3K9) 5¼" disc drive & mounting brackets for A3K2 - ideally suited for 65Host or using the PC emulator. £99.95

65 Host 1770 DFS & DFS Filer (A3K12) A ROM & disc upgrade forA3K6 provides - 1) a desktop DFS filer that allows DFS filesto be dragged to ADFS viewers or straight into applications as Edit or Pipedream. 2) BBC 1770 DFS for use in 65Host. Automatic Icon and loader which can allow BBC DFS discs to have <SHIFT BREAK> operation. "...effectively turns your A3000 into a model B..." Acorn User Sept '90. £19.95

Memory upgrades high quality memory expansions 1MB & 4 MB, multi-layer pcb, 100% Acorn compatible, from £68



"PRES's range of add-ons offers tremendous advantages. The system can grow with your pocket, it offers security and strength but most importantly it offers choice." (AU Feb.90)

The starting point is the monitor plinth, probably (we feel definitely) the best on the market @ only £24.95 (plus VAT), from there ... System Housing, Hard Disc Upgrade, Additional 3½" Disc Drive, Additional 5¼" Disc Drive, Podule Case, Dedicated A3000 Disc Buffer, 1770 DFS for BBC Emulator & DFS Filer for Desktop, plus more to come! (the last three products can be added independently of the other items)

Contact your local dealer or call PRES direct on 0276 72046 for advice on upgrading your A3000. We have built our reputation on honest dealing on quality products with thousands of satisfied customers.

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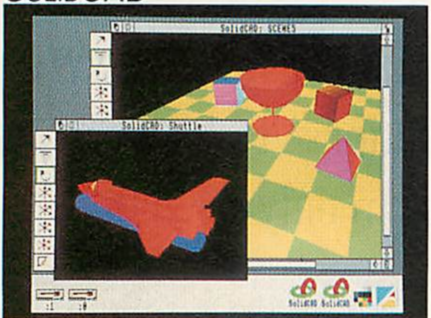
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(RISC OS) New

ARC-PCB

The original PCB design package developed specifically for the Archimedes with a specification that cannot be matched by any PC-based system. Features include Automatic routing, Rats-nesting, Multiple-layers, Circular & Surface mount Pads, 0.001" resolution, 32"x32" maximum board size, On-line Help, Fast Zoom/Pan/Redraw, Text & Silkscreen facility, Variable Track/Pad/Text/Grid sizes, Hierarchical Part Libraries, Block Move/Copy/Rotate/Mirror/Erase options, Component Pulling, Clear pad holes, Drilling data, and up to 300,000 components. Also supports industry standard HP-GL, GRAPHTEC, PLOTMATE plotters and printers at their highest resolutions for high quality PCB artwork.

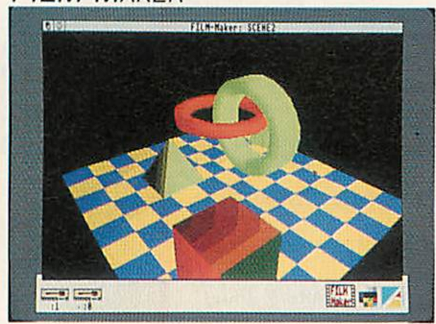
(RISC OS) New

SuperDump

The ultimate printer driver which takes advantage of the highest resolution capability of ordinary Epson compatible 24-pin & 9-pin printers to provide 1920x1024 resolution. Fully compatible with SolidCAD, Realtime Solids Modeller, Gate Array Design packages & any other program capable of creating VDU plotfiles.

(RISC OS) New

FILM-Maker



The package provides an interactive multi-tasking environment to create animated sequences of 3D scenes with dynamic camera motion for 'walk-throughs' and 'flight-paths' for objects within the scene. The fully graphical environment requires no programming or textual entry and the capability to calculate smooth shaded frames of complex scenes with lighting effects at very high speeds allows fast interactive design of animated sequences. Large numbers of these frames are then stored in a compressed format to play back at flicker-free rates for on-screen animation or video recording. Fully compatible with SolidCAD for design data & SolidsRENDER for ray tracing, animation Oscars are now within your reach.

(RISC OS) New

SolidTOOLS

The fully integrated environment for 3D CAD, Animation, Rendering & Hardcopy. The package includes SolidCAD, FILM-Maker, SolidsRENDER, Realtime Graphics Language, SuperDump & SuperPlot for a turnkey solution satisfying all your 3D Design and Presentation requirements.

(RISC OS) New

Presentation System

An interactive environment to create, edit and play-back computer controlled presentations for demonstrations and lectures. The contents of the presentation can range from textual to graphical displays consisting of lines, rectangles, triangles, circles, arcs, ellipses and sectors plus user definable graph plotting. Features include Subtitling and Pointers for hints, continuous playback mode, Back & Forward Paging facility and controlling external programs during presentations. Suitable for use on ordinary TV screens.

(RISC OS) New

SolidsRENDER



The most advanced Ray Tracing package for the Archimedes producing photo-realistic images of SolidCAD designs or FILM-Maker animations taking into account multiple light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence. The high-speed ray tracer uses sophisticated colour mixing techniques to provide the maximum range of colour shades plus anti-aliasing for smooth edges, motion blur effects, dynamic viewpoint, variable camera lens for wide angle and telephoto effects and multi-colour light sources driving the Archimedes display hardware to its limits for the best photo-realistic images within the laws of optical physics.

(RISC OS) New

RiscFORTH

A new 32-bit implementation of the FORTH-83 standard, designed to take full advantage of the ARM architecture. The language is ideal for process control applications including robotics, interfacing and realtime applications providing a comprehensive programming environment with built-in Editors, Assemblers, WIMP support and Standalone code generation.

(RISC OS) New

RiscBASIC

The best BASIC V compiler money can buy. Here's what the reviewers say:

"If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC"
- RISC USER August 1989.

"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language."
- Archive June 1989.

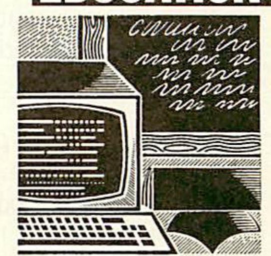
"If you want the best, buy Silicon Vision's complete answer" - Micronet August 1989.

"This is an excellent product, well supported" - A&B Computing April 1990.

(RISC OS) New

All software run in native mode on A300-400 Series & A3000 with RISC OS. Enquire for our free product Catalogue

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EDUCATIONAL TECHNOLOGY AWARDS

For the second year running Sherston Software has hit gold in the primary category of the Educational Technology Awards. The Wiltshire-based company has won with *Connections* (Archimedes), a National Curriculum maths program which asks pupils to make mathematical links. *Teddy Bears' Picnic*, also from Sherston, was the top primary package last year.

The silver award went to Longman Logotron for *Archimedes Pendown* (Archimedes), its enhanced version of *Pendown*, the classic educational wordprocessor. The bronze was taken by *Find Spot* (Nimbus) from the Inner London Educational Computing Centre, a package based on the popular Spot, the dog, character.

Commendations went to Hybrid Technology's *Soundspace* (Beeb/Master), music software for young children, including those with special educational needs, and SPA's *Write On* (PC) wordprocessor.

In the secondary section, *Control By Design* (Master) was the undisputed winner. As well as being the panel's favourite, Economatics' multi-dimensional design system, based around on-screen flow-charts, received more nominations than any other package.

Oak Solutions scooped the silver award for its much-more-than-just-a-database, *Genesis* (Archimedes). Bronze went to ESM's *Kaleidoscope* (Beeb/Master), a program bringing out the beauty of geometry.

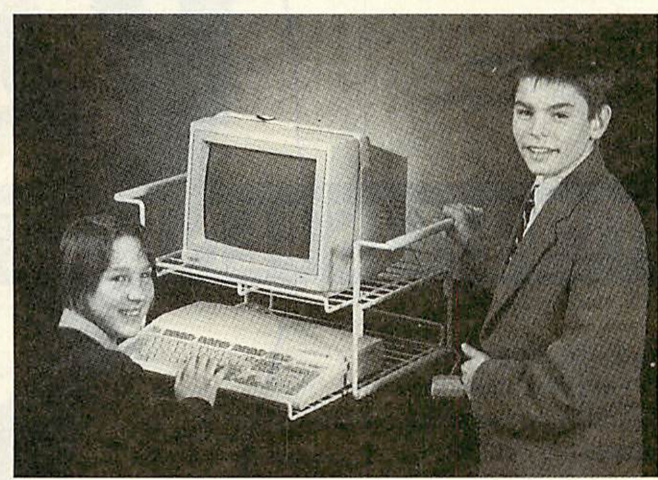
Also commended were *!Orrery* (Archimedes), Spacetech's computerised model of the solar system, reviewed in this issue, *Now Read On* (Nimbus), promoting foreign language learning and again from the Inner London Educational Computing Centre, and 4Mation's *Poster* (Archimedes) program for designing posters.

The Educational Technology Awards reward companies creating innovative products for the educational market. Nominations came from teachers all over Britain and the winners were chosen by a panel of experienced educationalists.

Representatives of the winning companies received their awards from under-secretary of state for education, Michael Fallon, at the opening ceremony of BETT '91.

There will be a full round-up of news from the BETT show in next month's education page.

The Educational Technology Awards are sponsored by *BBC Educational Computing and Technology* magazine, the BEEA and Emap Exhibitions.



The Computer Basket, a successful Australian invention popular in schools Down Under, is now available in the UK. Built from lightweight but sturdy plastic-coated steel, it makes moving the classroom computer easy. Working in pairs, even quite young pupils can transport micros around the school and, as the computer stays in the basket permanently, they never have to lift the machine on its own. The Computer Basket can accommodate any desktop machine and trailing cables can be wound round its handles for safety. It is distributed by Rickett Educational Media, which also has an extensive educational software directory. The company can be contacted at Ilton, Ilminster, Somerset TA19 9HS.

ACORN AHEAD

Acorn has announced that independent market research confirms the company as the major supplier of computers to UK schools.

Data from MaS shows that in the first eight months of this financial year, 53 percent of all computers shipped to schools have been Acorn machines, with the Archimedes and A3000 outselling the Master 128 by a factor of two to one.

Chris Humphries, Acorn's education sales and marketing manager, pleased with the findings, commented: 'These figures once again confirm Acorn's continued lead in educational computing and round off an excellent year for Acorn.'

Meanwhile, Research Machines, Acorn's principal rival in the education sector, has also announced record results, with the statement: 'Growth through continued success in both schools and further and higher education has reaffirmed Research Machines as the UK's leading supplier of computer systems and support services to the education sector.'

The two companies obviously look at the market in a slightly different way, but it is interesting to note that they are both holding up in an increasingly tough market.

Lisa Hughes

NEWS IN BRIEF

● ***Parents' Evening Appointment Package*, or *PEAP* for short, aims to meet demand for an easy means of organising appointment-based parents' evenings. The user enters the requirements of each parent and *PEAP* does the rest, from calculating appointment times to printing individual slips for parents and teachers.**

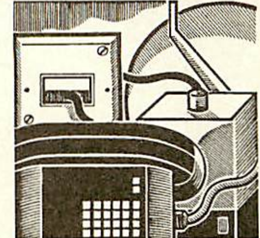
Developed with a school in Leicestershire, *PEAP* costs £34.44, runs on the BBC B or Master and is available from: Grange Software, 88 Grange Road, Wigston, Leicester LE8 1JJ.

● ***Over the Rainbow* is a self-development guide with an IT focus which aims to broaden the career expectations of girls by introducing them to potential types of work which they may not have thought about.**

The pack consists of a workbook and audio tape with information, activities and self-assessment exercises which are illustrated by cartoons and other graphics. It costs £12.95 (discounts available for bulk orders) from: The Domino Consultancy, 56 Charnwood Road, Shepshed, Leicester LE12 9NP.

● **A couple of dates for your exhibition calendar. The Education Show is new but has a full list of exhibitors and promises a 'complete overview' of educational products and services. It runs from March 7 to 9 at London's Olympia 2. Details from: Emap International Exhibitions, 12 Bedford Row, London WC1R 4DU.**

The Educational Resources Exhibition is already established and has a similarly broad spectrum of companies. It runs from March 21 to 23 at the NEC in Birmingham. For further details write to: CRE, 2 Forge House, Summerleys Road, Princes Risborough, Buckinghamshire HP17 9DT.



SO YOU WANT TO BE A SYSOP?

A Sysop is computer speak for a SYStem OPerator – a person who runs their own bulletin board (BB). Over the past year or so, the number of Archimedes dedicated BBs have grown from two or three to virtually one in every county.

Setting up your own bulletin board used to be limited to the real computer enthusiast or comms expert.

Nowadays though, all you need is a computer, a modem, a telephone line and a minimum of comms knowledge.

Most people who have logged onto an Archie BB recently may have noticed a feeling of *deja-vu*, or at least some vague familiarity about many of the commands used.

This is because a high percentage of BBs now run on *ArcBBS*, a bulletin board Host system developed by Hugo Fiennes of The Serial Port, otherwise known as ALT-Man, and Sysop of the infamous World of Cryton bulletin board.

ArcBBS is an extensive multitasking program that allows you to run a bulletin board on your Archimedes with the minimum of problems, for either a single, or up to three separate phone lines.

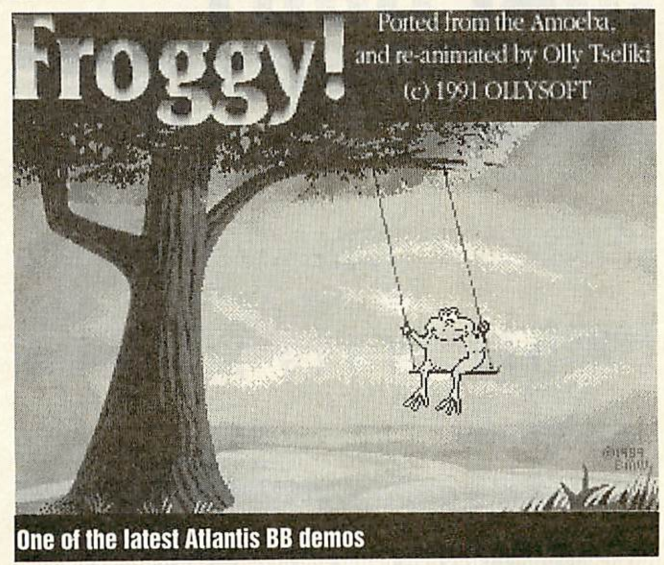
So, assuming you want to become a Sysop, what do you need to acquire, and more importantly, how much is it all going to cost.

Firstly, you need a computer; an Archimedes is best, although you can (and a great many people do) run perfectly good bulletin boards (Equinox is one example) on a Beeb.

On the Beeb, you'll need a dedicated machine, as your bulletin board will cease to operate if you want to, say, have a quick bash at *Snapper*.

ArcBBS is multi-tasking, but of course not everything else on the Archie is - or indeed fast enough to run simultaneously with someone whizzing around your board.

So... you've found yourself a spare computer to run your bulletin board on. Next you'll need a decent modem – the minimum requirement is an auto-answer facility. Most BB host software will also require Hayes commands to control it, although some can be customised to work with other modems.



One of the latest Atlantis BB demos

The speed is up to you, but the faster it can run, the more people will be interested in using your system, and the less time each user will occupy your phone line – which again, is another expense.

A new phone line will cost around £150 to have installed. If, initially, you don't want the outlay of a new phone line, some BB software allows you to support what is known as 'Ringback'.

This is where you dial the number, allow it to ring a couple of times, and then drop the line and ring back, whereopon the computer at the other end of the line will answer.

Although this is a bit fiddly, it works well if you want to use your existing phone line.

To store all your files and user information you'll ideally need a hard disc, which again should be as big as possible.

A minimum would be 20Mb, although you can expand this as your BB – and wallet – grow.

ArcBBS is available now for £99.95 for a single-user version, or £159.95 for the three-line version.

To see an example of its comphrehensive features, log onto one of the following bulletin boards – all of which use the *ArcBBS* system:

- Arcade: 081-654 2212
- Archive: (0603) 745932
- Noah BBS: (0272) 572322
- Darc World: (08675) 77724
- Atlantis: (0452) 330238

If you already run a bulletin board, then please send me details. You may get a plug in future columns.

TELECOM NUMBERS

There are now so many faxes and telephone numbers in use in the United Kingdom, that British Telecom could be in danger of running out of available numbers.

It has already made a proposal to Oftel, the Telecommunications Watchdog, to extend the number of digits in national codes.

'We are unable to comment now, although an announcement will be made in due course', a BT operator said, 'in any case, there would be at least two years notice before any such change occurred.'

Paul Vigay

NEWS IN BRIEF

● Three years after the launch of the Archimedes, Beebug is set to launch the first internal v22bis modem podule for the machine.

An internal modem has been promised for some time, but only recently has the technology become advanced enough to allow the price to be reasonably competitive.

Beebug's offering will offer all speeds up to and including v22bis (2400/2400 baud) and will be an auto-answer, auto-dial, fully Hayes-compatible piece of equipment.

Although the price is yet to be decided upon, I have heard rumours that it will be around the £200 mark, making this an even more desirable acquisition.

Keep reading this column for future information.

● Computer Concepts is still working on its long-awaited fax podule for the Archimedes.

Initial problems with Risc OS, together with difficulties obtaining the required fax controller chips halted production.

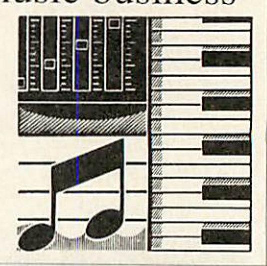
However, Computer Concepts is hoping the Fax podule will become a reality sometime this year.

● Two new bulletin boards have just been set up, both of them using The Serial Port's *ArcBBS* Host software.

Atlantis BB, based in Gloucester, supports all speeds up to v22bis, including MNP (level2), and includes numerous file and conference areas.

The second new bulletin board is located in Oxford. It is called DARC World and again it includes loads of downloads and conference areas.

I'd say both are well worth adding to your comms directory. Why not call them up and decide for yourself...



MORE RHAPSODY

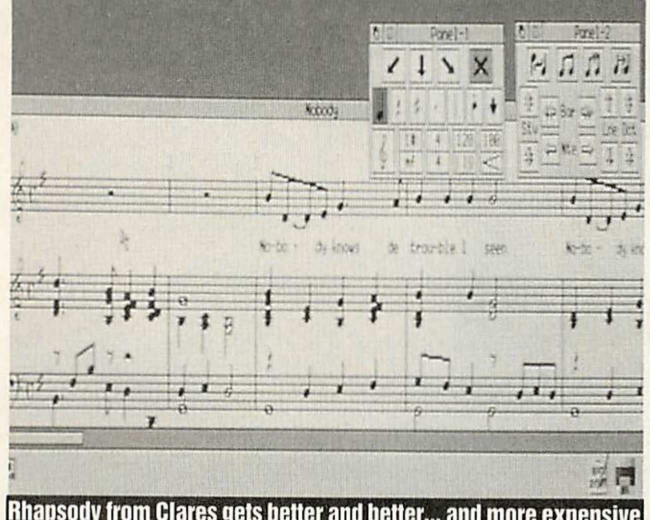
Development of *Rhapsody*, the music notation/scorewriting program (reviewed in *BAU*, January 1990), continues and it has now reached version 1.12. Some minor bugs have been fixed and many extra facilities have been added. The main additions include:

- Variable stave heights have been introduced
- It can send Midi Program Change messages at the start of, and during, a piece
- The resolution of the sprites has been doubled, giving a much better printout
- The spacing of each stave can now be controlled
- Notes and symbols can be dragged from the control panel with the mouse and 'plonked' on the stave. This greatly speeds up note placement and is a welcome alternative to the cursor system (which is still retained)

There are around 20 other modifications, many relating to the handling of repeats.

Due to the number of changes made since the launch of *Rhapsody*, it looks as though the price will rise by about £10 (serves you all right for saying it was underpriced!), but existing owners will be able to upgrade for the price difference.

It looks likely that a *Rhapsody* file player will be developed for *Genesis 2*. More details are available from: Clares Micro Supplies, 98 Middlewich Road, Rudheath, Northwich, Cheshire CW9 7DA. Tel: (0606) 48511.



Rhapsody from Clares gets better and better... and more expensive

HAPPY BIRTHDAY

Amplinex, the user group for AMPLe INformation EXchange, has just celebrated its fourth birthday. As well as a selection of music written by members, each issue (which comes on disc and is written in Ample) contains hints, tips, utilities and programs for the Hybrid Music System (HMS).

Issue 19 includes an article on how to use the Music 5000 as a Midi expander(!) and an index to the last six issues of Amplinex – find out what you've missed.

If you have a Hybrid Music System and have not yet joined Amplinex, send £5 and a blank formatted disc with return packaging and postage to: Amplinex, 26 Arbor Lane, Winnersh, Berks, RG11 5JD. It's the essential Ample add-on!

SYMPHONY FOR HYBRID

Symphony is the latest music disc for the Hybrid Music System from the talented baton of John Bartlett. It's worth reviewing here because it's an excellent piece of programming, well up to John's usual standard, and is particularly recommended to anyone interested in interpreting classical music on the HMS.

It contains three selections from Beethoven's Pastoral Symphony, the first and third movements of Vivaldi's Violin Concerto, two Mozart excerpts and three movements of a concerto written by John especially for the HMS.

In the accompanying blurb, John apologises if the interpretations don't suit everyone. Why are HMS composers so humble?

The second reason for mentioning it is because John has attempted to recreate an orchestra on the HMS and it's really not up to the job. There are some sounds – brass, for example – which it just cannot synthesise.

This is why, in my opinion, the HMS is more suited to original music or material which is capable of 'alternate' arrangements – I don't feel classical music makes the transition well.

If you disagree, write and tell me. This is not meant to be at all disparaging towards either the HMS or JB's music.

Also, John's concerto is written in a conventional way, which means it's hungry of memory and therefore fairly short.

Nothing wrong with that, but it would be interesting to write a piece of music which made use of the HMS's strengths and programming facilities – such as loops (and offsets), random factors and the ability to mix, match, stretch and shrink music lines, for example, to make a piece which lasts, 10, 15, 20 minutes of more. Now there's a challenge!

The cost of this masterpiece is £3.95 from: JB Software, 20 Crawley Avenue, Wellingborough, Northants NN8 3YH. Tel: (0933) 675392.

Ian Waugh

NEWS IN BRIEF

● Demo discs of *Tracker*, the sample-playback music program for the Archimedes, have been around for a while. Now a commercial version, which lets you create music as well as play it, has been released and made an appearance at the recent Computer Shopper Show.

Based on *Soundtracker* for the Amiga, *Tracker* can read Amiga and ST *Soundtracker* files but, running on the Arc, it has eight sound channels and many more powerful facilities. *Tracker* costs £49.95 from: The Serial Port, Burcott Manor, Wells, Somerset BA5 1NH. Tel: (0243) 531194.

● Hybrid Technology has launched 10 *Hybrid Music System* educational packages. Prices range from £99 for the Basic Primary System, which includes the Music 5000 and Universal software, to £729 for the Expanded Secondary System, which has the full range of Music modules, software, Midi Interface, Amplifier, speakers and leads. The systems can all be expanded.

For details, contact Hybrid Technology Ltd, 273 The Science Park, Cambridge CB4 4WE. Tel: (0223) 420360.

● The second Midi Music Show will take place on April 26-28 at the Novotel in West London. There were 65 exhibitors and over 5000 visitors at last year's show. This year more than 100 exhibitors are expected, with regular seminars and presentations. Contact Westminster Exhibitions on 081-549 3444.

● In the next Music column, details of free – almost! – music programs for the Arc!

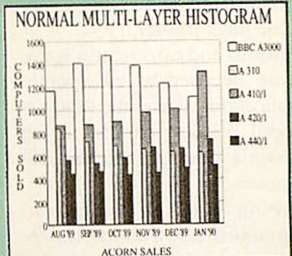
If you have music news, tips or topics – particularly on the Archimedes – you'd like to see in this column, write to : Ian Waugh, *BBC Acorn User*, 20-26 Brunswick Place, London N1 6DJ.

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- **Diary** — A multi-tasking Desktop Diary and calendar.
- **B_to_T** — Application Handler which allows programs to be edited without leaving the Desktop.
- **FileFind** — File-find utility which performs hierarchical search for a given file, application or directory.
- **SetType** — Filetype Setter which you can use to change the filetype of any file by dragging it to the icon bar.
- **HotKeys** — A Desktop hotkeys utility that allows single key presses to perform a wide range of functions.
- **Mouse** — Mouse-speed Controller for changing the mouse speed merely by clicking on an icon.



- **Print** — Multi-format Print Utility — allows text and program files to be printed just by dragging them to the icon bar.
- **NotePad** — A Desktop Notepad application which provides for up to eight pages of jottings.
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mARC THREE



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- **Amaze** — a graphically superb and entertaining game.
- A selection of the best **Maestro music files.**
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by

David Spencer and Mike Williams

£9.95

File Handling for All is a comprehensive book which covers all the requirements of data storage and processing by computer, using the popular BBC Basic programming language for the examples. It is aimed at anybody interested in File Handling and Databases, whether beginners or more advanced users, and will appeal to all who want to learn more of this important subject.

The book starts with an introduction to the rudiments of file handling, and in the following chapters develops an in-depth look at the different types of files e.g. serial files, indexed files, direct access files, and searching and sorting. A separate chapter is devoted to hierarchical and relational database design, and the book concludes with practical advice on developing file handling programs.

The associated disc (£4.75) contains complete working programs based on the routines described in the book and a copy of Filer, a full-feature Database program.

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Please note postage for the discs is £1 for Europe and £2.40 elsewhere; the book is £1.60 Europe and £4.80 elsewhere.

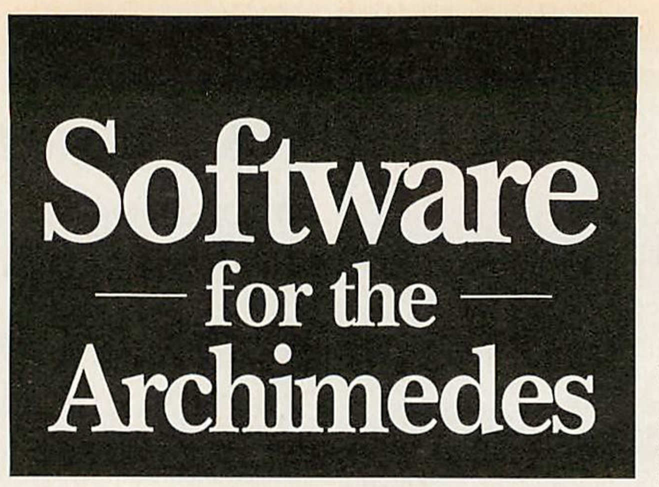
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An equation building tool that complements many RISC OS applications, in particular DTP and word processor programs such as Impression and Impression Junior

Many users of the Archimedes have a need to include complex mathematical formulae or equations into documents. Equasor allows equations to be built up on screen, graphically, from their component parts. Using the Acorn outline font system it presents a totally accurate view of the final equation at all times.

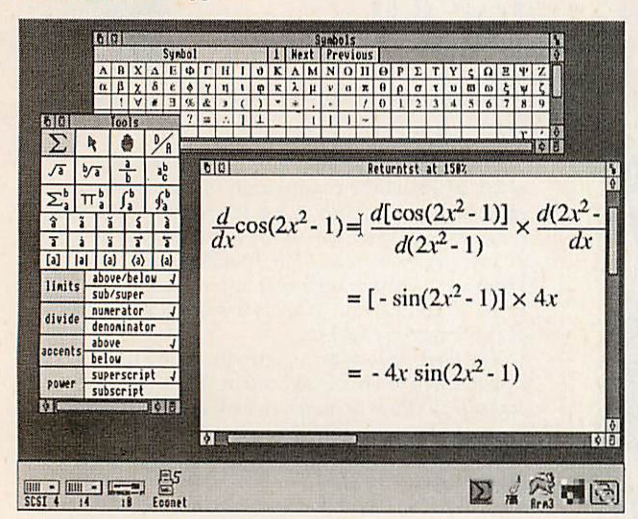
It simplifies the building of equations by presenting palettes of symbols, functions and operators which can be selected just by clicking with the mouse. It intelligently scales and re-sizes features such as summation symbols, brackets, and square roots as the equation is edited so they are always the right size.

Once the equation has been created it can be saved or exported as a Drawfile to any number of compatible RISC OS applications. In DTP packages it can be dropped into frames just like any other drawing where it can then be scaled and positioned as required.

When used in conjunction with Impression II, it can take advantage of the latter's embedded frame capability to embed equations into the text, even on the line. Once embedded in this way the equation will then flow with the text as part of the text.

Features:

Multi-tasking RISC OS application, can be run at the same time as other applications. Supports direct in-memory transfer of equations for the fastest, simplest integration with other RISC OS applications. Any number of equations can be handled at the same time. Equations can be viewed and edited at any scale. Saves equations as Drawfiles compatible with all applications that support this format. Supports multiple different RISC OS outline fonts and so is not limited to the Math/Greek font supplied.



•Supports region selection and cut, copy, paste between equations and documents.

•Styles for global control over fonts, size, spacing etc. of variables and operators.Effects give additional control over the appearance of individual parts of an equatlon.

•Small, compact program perfectly suitable for 1 Mbyte machines.

Included in package a 60 page spiral bound manual with detailed tutorial reference, and index. Discs include the program, example equations, and Math/Greek outline font.

£49.00+VAT (£56.35 incl.)

ShowPage

ShowPage is a PostScript compatible interpreter running under RISC OS.

Over the last 6 years PostScript has established itself as an industry standard graphics programming language. Pioneered by Adobe for use in the original Apple laser printers it is now used in all manner of output devices such as colour printers, and typesetting machines.

ShowPage will be attractive to those wanting to learn and explore this programming language and those wanting to print and use PostScript files from other machines.

ShowPage is fully multi-tasking and RISC OS compatible. It can output any PostScript file either to a window on screen, or to the currently selected RISC OS printer. It can therefore be used to make even the lowest cost dot-matrix printer PostScript compatible. When used in conjunction with LaserDirect, it can turn this printer into a very fast and fully fledged PostScript compatible laser printer.

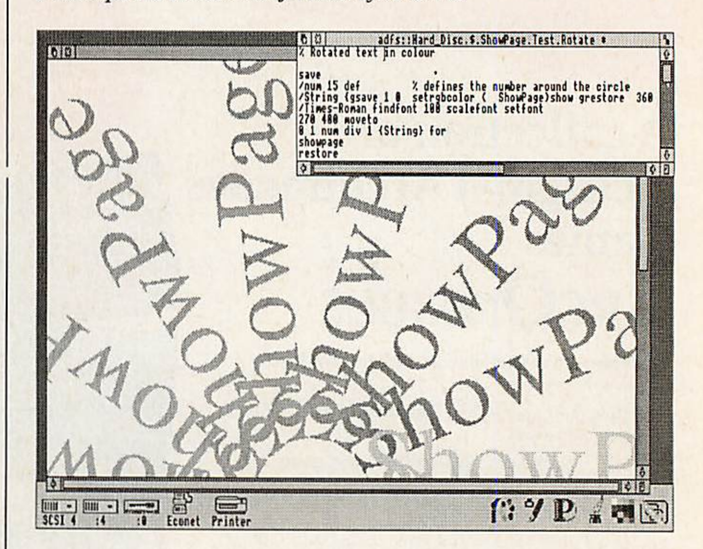
ShowPage supports the colour extensions and can create a sprite file of any required size. It can therefore be used to incorporate PostScript graphics into other RISC OS applications. It uses the RISC OS outline fonts, rather than the conventional PostScript fonts, for all rendering, so it is compatible with the wide range of Archimedes outline fonts now available for this computer.

ShowPage has a built in editor allowing PostScript programs to be created and executed directly, and interactively with the results shown on screen in another window.

Showpage is compatible with the output from Acorn PostScript printer drivers. Minimum recommended memory is 2Mbytes.

ShowPage can also be used with Laser-Direct to allow fast RISC 0S printing over Econet.

PostScnpt is a trademark of Adobe Systems Inc



Illustrates example ShowPage program and resultant output

Package includes a spiral bound manual detailing the ShowPage version of the language. 320 page PostScript language reference manual by Adobe. 240 page PostScript language tutorial manual by Adobe. Discs containing ShowPage and example programs. AvantG, BookM, Pembroke RISC 0S outline fonts.

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STUMPED!

I have recently purchased an A3000 Learning Curve for my children and while I regard myself as not being computer literate, I am becoming more and more hooked. I am also becoming very frustrated by my lack of knowledge.

I am learning very slowly but, every so often, I come up against a blank wall and the manuals and other literature do not seem to cater for people like me who have little or no background knowledge about computers.

One problem I am currently trying to solve involves running the programs on the monthly disc supplied with my *BAU* subscription.

By trial and error, I am able to load the programs dedicated to the Arc, but not the others. Am I right in saying that, if I use *!65Host*, I will be able to run them as well? If so, then how?

I appreciate this may be a basic question (no pun intended) but the answer is beyond me.

J Luke
Southampton

In the Acorn market there are two types of machine. The original eight-bit models such as the BBC model B, Master 128, Master Compact and Electron, and the more recent A3000 and Archimedes series which have 32-bit processing power. The monthly disc includes programs for both types of machine.

The reason why many eight-bit programs won't work on an Archimedes is the difference in the machine code – this is the code used by the computer to tell the central processing unit (CPU) what to do.

It is possible to run most of the eight-bit programs from the monthly disc on your machine with *!65Host*, the eight-bit BBC model B emulator. This emulator literally interprets the eight-bit machine code into 32-bit machine code, one instruction at a time. A recent example of an eight-bit program that works under the emulator is the *HatTrix* game published in the January issue of *BAU*.

Run the emulator by double clicking on its icon. From now on, until you press the reset button, or type *QUIT, the A3000/Arc will act like a BBC micro, or as close as it can get. For instance *CAT (*. for short) will catalogue the disc. *DIR <directory name> will go into a directory, just the same as double clicking on a folder in the desktop.

CHAIN"<filename>" will load and run a program.

The A3000 also has its own Basic language which is far more powerful and faster than the BBC micro emulator.

Pressing function key 12 while in the desktop will enter command line mode (see section 3 of your User Guide about using the command line). Typing *BASIC will gain you access to Basic, type *DESKTOP to return to the desktop.

If you are interested in learning more about Basic on the Archimedes then Dabs Press sell a book called *Basic V, a Dabhand Guide*.

Don't forget to keep reading the First Steps series in *BAU* for more advice and help on using the A3000 and Archimedes.


Yet more power behind the desktop

WORLDS APART

Just a short letter to congratulate the writers of *Twin World*. What a masterpiece! The game is a joy to play from start to finish. Each evening when I get home from work I load it up and try to improve on my final score of 55,950. The game is simply marvellous and is one one the best.

The authors of the game *must* be forced to write more for the Arc. If this is what the standard game is like on the Amiga, then where have the writers of Acorn games gone wrong?

Got to go – I have to save the world, again!

Neil Newman
Faringham

***Twin World* (reviewed in the February issue of *BAU*) is an exceptional game, even for the *Amiga*, and we agree, let's have more UBI Soft!**

COMPACT GRAPHICS

My children use an A3000 at school and they enjoy using graphics programs like *Arcol* and *Proartisan*.

At home we have a Master Compact. Are there similar programs available for this machine?

M Collins
Worcester

The Compact will never be able to match the Archimedes in graphics power but there are many graphics packages around that will allow you to use the machine to the full. Recently published was the *Picpac* program over the three months beginning from October 1990. Watford Electronics also sells a package called *Quest Paint* which won the *BBC Acorn User* 1990 Award for the best art/graphics package. Take a close look through the adverts in *BBC Acorn User*, you are sure to find what you want.

MORE EIGHT BITS?

As a regular subscriber to *BAU* and a keen Beeb user, I am looking carefully at whether or not to renew my subscription.

I am concerned that your magazine is gradually moving away from us Beeb users and producing more for A3000 and Archimedes users.

I have read you magazine since 1985 and still believe it is the best on the market. Although I am keen to upgrade to 32-bit in the future, I cannot afford to do so yet – and anyway, I enjoy using my Beeb and will still hang onto it even when I do.

L Jackman
London

We obviously appreciate your loyal support and we will continue to cater for all eight-bit users. Our new series on some of the best Beeb programs we have run form part of our plans to ensure you are looked after. So keep on subscribing to *BAU* in the future!

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PROBLEMS

A selection of problems from our Post A Problem service



QUESTIONS AND ANSWERS

Q I have an unexpanded model B and have just managed to purchase a secondhand 512 co-processor to use with it. I now realise the co-processor was developed for the BBC Master 128.

Can it be adapted for use with the model B?

A Thompson
Yeovil

A You are rather lucky to have found a 512 board! Have no fear – you can use the 512 board with your Beeb. But it cannot be fitted internally, like in the Master 128.

You need to purchase an Acorn or Watford Electronics universal co-processor box which will cost about £35. The 512 board is installed inside the box and the box attached to the machine.

Q My BBC A3000, which I use with a Canon PW-1080A printer, will not work properly with *First Word Plus*. The text side of things seems to work alright but, when it comes to graphics, there's trouble. Is my printer at fault, or could it be the software?

What can be done?

S Fregg
Rye

A I believe your problems are due to the use of the incorrect printer driver. You are probably using an Epson FX driver or another Epson driver supplied with this package.

Although the Canon PW-1080A is broadly Epson compatible, it is not totally, and that could be your problem when printing graphics.

I suggest you buy a Shareware disc of *First Word Plus* printer drivers from Norwich Computer Services, which advertises in BBC Acorn User.

The disc costs about £3.50 and contains lots of different drivers and, from memory, it does include one suitable for your printer. You should check this with Paul Beverley at NCS.

Q I have been very pleased with the *Hemera* desk diary program that was published some time ago in BAU. I have used it all year and it has been wonderful! However, I feel the good is coming to an end. I cannot seem to get the program to access dates beyond December 31 1990.

John Crump
Windsor

A The reason for your difficulties is the way the program is written. You need to create a new diary file using f5 from the options menu and, after you have input the Drive, Directory and the new file's name, you will be asked for the year that the diary file is for. With *Hemera* each diary file can only cope with a full year.

Can I warn you that, due to the length of the diary file, it is best to keep the main program and one diary file per disc.

Q I have an Archimedes 440 which I am using with Acorn DTP to produce an A5 leaflet.

It does not seem to allow me the control over the printed page that was promised as I cannot get the package to print two A5 pages side by side. What would you do to accomplish this?

Mr S Alacot
Ditchling

A You should use Page format and choose A5 paper (148.5mm x 210mm), landscape orientation. You will want different left and right pages, so leave a margin down the middle of the inside spread equal to the outer margins.

Set the inside margin to be half of the outside margin when you set up the column guides and draw frames.

Q I have a BBC A3000 which I have used to play games and have been impressed! It's great! But I now want to start learning a bit of Basic myself.

I thought I would start by typing in an A3000 listing and try to begin to understand things as I type. I know I cannot program in Basic in the desktop, but how do I leave the Wimp behind?

Ted Cohen
Peckham

A The simplest way to leave the desktop is by pressing f12, which puts you in the command line mode.

Here you should type Basic at the star (*) and then press RETURN. You can now type in your Basic listing from the magazine.

Don't forget the line numbers and remember that, when typing the listing in, you have to put spaces exactly where the listing has them.

Q I've recently acquired an Epson TF-16 5.25in drive, which I wish to use with my BBC computer. At present I have two 3.5in disc drives attached. Will I have any problem adding a 5.25in drive to my system?

N Belham
Badsey

A As your two existing drives are double-sided, you are already accessing the maximum number of drive surfaces that any BBC eight-bit machine can at one time.

You could hitch up the 5.25in drive by removing one of the 3.5in drives. The BBC uses standard connecting leads from the disc drive interface to the disc drive, whether you have 5.25 or 3.5in drives.

Q I have recently purchased a BBC A3000 with a colour monitor. Is possible to convert this colour monitor for use as an occasional TV.

R Billam
Rotherham

A You can use a TV tuner with certain makes of monitor so that it can be used as a TV. Certain Phillips monitors are normally suitable. However, some of the colour monitors supplied with the A3000 are not. Let's hope yours is okay.

I know that Watford Electronics markets TV tuners. I suggest you contact it to see if they will work with your version of the Acorn monitor. A tuner costs from £65 to £80.

Q In the office I use a PC with a Winchester hard disc, but I decided to treat myself to 32-bit technology at home, rather than have another dated 16-bit computer. Well, I'm impressed.

The BBC A3000 is wonderful, but I'm already anxious to upgrade my system to hard disc so that I can store and load programs quicker. A friend said I should go for a drive that connects to a SCSI Interface.

What kind of drive would you recommend as being suitable?

Bill Boneham
Shaftesbury

A You should be able to use any compatible SCSI hard drive with your BBC A3000. But don't forget that you have to first install the necessary Acorn or third party supplied SCSI interface suitable for the BBC A3000.

A range of SCSI drives is available but costs vary. I suggest you check the cost of SCSI drives with various companies.

Q I'm considering buying a colour printer to use with my BBC model B. The printer must be compatible with an art package called *Image* that my daughters use at primary school.

I have seen some very reasonably priced Star colour printers – will one of these be alright?

R Dodds
Beaworthy

A If your children have been using *Image* at school, they probably obtained the printout with the Integrex Colour Inkjet printer. *Image*, which was developed by Cambridge University Press, is not compatible with the Star range of colour printers.

***Image* only has printout facilities for three colour inkjet printers – Integrex, Canon and Tandy, all of which are rather pricey – between £450 to £600.**

However, there may be a solution. You may be able to dump the screen with a screen dump Rom. I know that *Snatch* from 4Mation supports Star LC-10 colour printers.

Q When I bought my BBC A3000 I did not buy a colour monitor as I thought that I would be able to connect up my Sony TV and obtain colour images on the screen. But I am having considerable difficulties with the connection of my television to the computer.

Alan Lewis
Cwmcarn

A I'm afraid that you will only obtain monochrome output from the video output socket on the BBC A3000.

To receive colour output from the RGB socket, you have to have a colour monitor or television capable of accepting RGB input.

Unfortunately, I believe your televison only receives an analogue signal.

But you should be able to use your Sony TV if you buy a PAL encoder and fit this between the TV and the A3000.

ACORN CUSTOMER HOTLINE

As recently revealed in BAU, a new fileserver has been released by Acorn. Developed in conjunction with Software (now Oak) Solutions, *Level 4 Fileserver* is a new software-based fileserver running on any Archimedes computer with at least 1Mb of memory and appropriate disc storage.

It can be run as a Risc OS desktop application, or in standalone mode, for maximum performance and security to provide users with file access and mail facilities.

The fileserver can transfer files from any standard media type, including Winchester or floppy disc, SCSI or ADFS, CD Rom (compact disc with CDFS), or use the Internet Protocols to communicate to a remote host via Econet or Ethernet and NFS. Activity monitoring is included to improve the quality of information the System Manager requires.

Compatible with existing Acorn fileservers, *Level 4 Fileserver* offers the advantages of Risc performance, flexibility and economy, letting the server double up as a user machine on lightly loaded networks and encouraging the sharing of data between work groups.

Also in this product is an advanced printer spooler which can support multiple printers and Risc OS management software, simplifying the task of setting up and day-to-day operation of the desktop environment.

Another important development that will be supplied as part of the fileserver is the *Broadcast Loader*. Classrooms provide a severe test of a network, when all pupils need to download the same application at the start of a lesson. They can cause network loading far in excess of the levels conceived of by the network industry, and it often results in frustrating delays.

The *Broadcast Loader* program, designed by Digital Services Ltd, is an elegant software module and enables the broadcast of files that are required by several users. Independent of fileserver type, the module is loaded to all client users and utilises a new broadcast packet type to ensure that multiple requesters of a file are all loaded simultaneously.

Although BBC and Master 128 machines may not participate on broadcast transmissions, they can co-exist on the same network as the data-hungry Archimedes computers.

● There are now a number of 440, 440/1 and R140 owners who have fitted 8Mb memory expansion cards to their computers and now find that their PC emulators do not work.

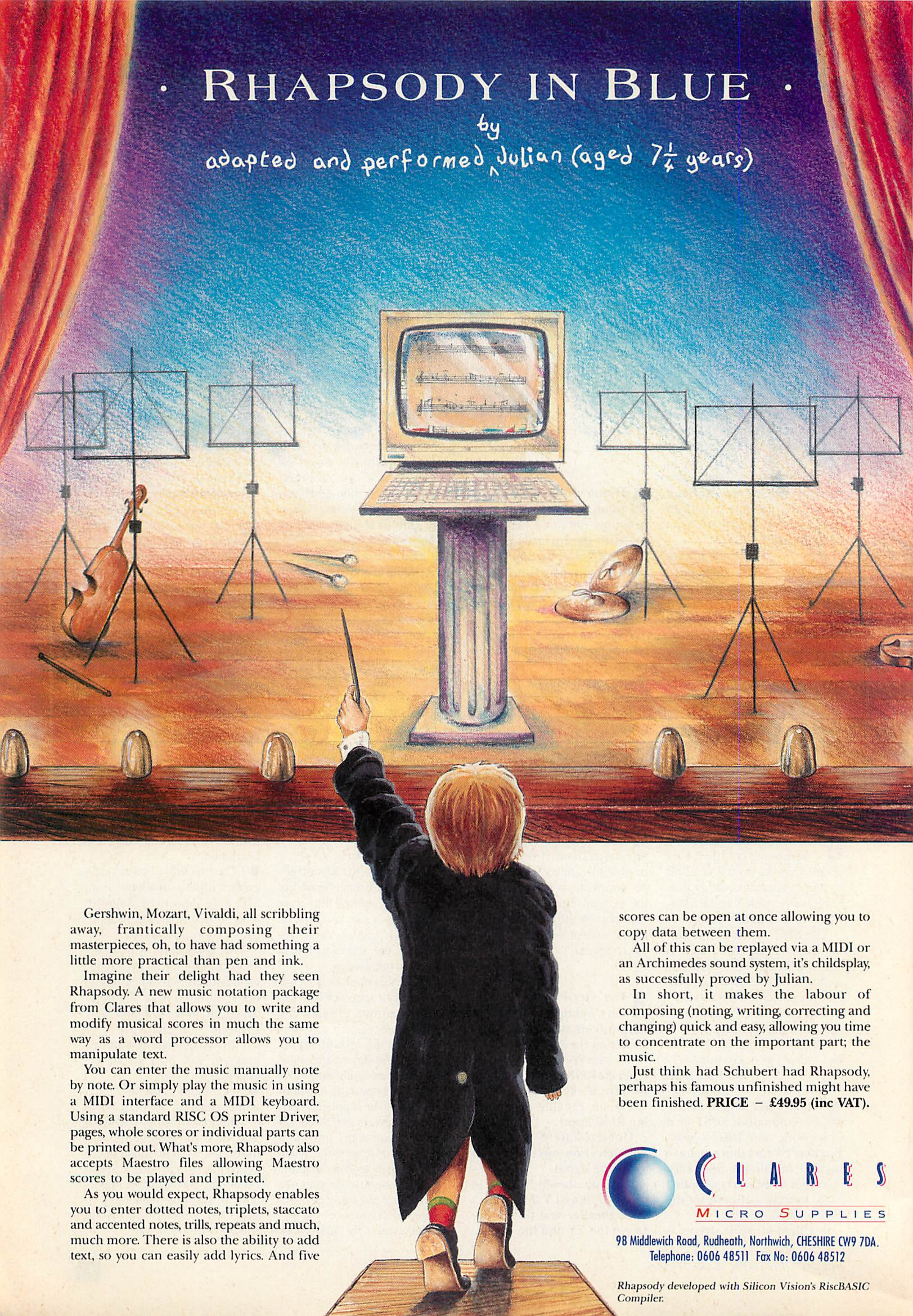
Acorn has developed a patch for the PC emulator to enable it to work with machines with more than 4Mb of memory. This patch can be obtained from SID (Acorn's Support Information Database) or from any SID registered dealer.

The patch only makes the PC emulator work again and offers no advantages in speed or memory availability under PC emulation.

● In last month's hotline, new printer drivers available from SID were announced. Supplied with the new drivers is an application called *!SysMerge*.

This application is designed to make merging *!System* applications much more simple. Using the application is as simple as dragging your old and new *!System* application to !SysMerge dialogue box and the program will then do all the updating necessary.

● Next month's hotline column will include an announcement of important changes to SID. The new developments will make the system much more accessible to many users. SID is becoming increasingly important in allowing customers to gain new product information and updates to software.





For all Archimedes and A3000 owners, **DAVE ACTON** has compiled

RISC REVUE

£15 BIO PIC

There's something of a fractal theme to this month's Risc Revue. If you thought the subject began and ended with the inventions of Monsieur Mandelbrot, we might have something new for you.

Here is an Arc version of one of the famous 'biomorph' functions, from **A Reysenbech**. The dictionary describes a biomorph as a representation of a living thing in decoration.

Like many fractal pictures, there is more than a hint of the natural world in it, which isn't surprising in that the picture, like many elements of nature, is built up from essentially simple rules.

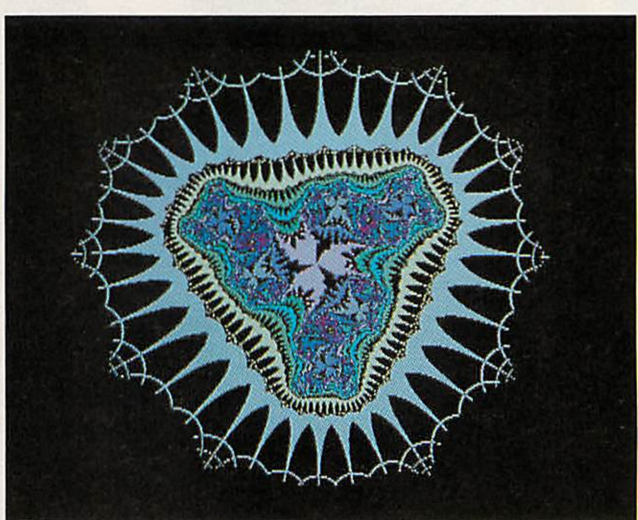
For speed, the program is written in assembly language. Just enter it and run (ensuring you have at least 160K of screen memory available).

Like many functions of its kind, listing 1 uses complex numbers and an iterative process to produce the picture. The image is made up of 552 by 256 pixels and for each a 'real' and 'imaginary' part is found. The centre of the screen is taken as (0,0). The real part is the x distance from the centre, the imaginary part is the y distance. These values are manipulated and, depending on the results, the iterative process is repeated or the pixel is plotted.

Five values used within the program may be changed to provide different effects. The variables shift1 and shift2 represent scaling factors. Try changing these to 0 – you will see a close up of the 'jungle' in the centre of the design. Changing dec will affect the colours used.

A counter is maintained and decremented by dec each time the inner loop is executed. This counter is actually the colour plotted, so the different colours in the final design indicate that the iterative process was repeated different numbers of times for those points.

Altering const1 or const2 will affect the design in less predictable ways.



GALLOPING GASKETS

Many of you will have read with interest Mat Tizard's piece on Sierpinski's Gasket (*BAU*, October 1990) and subsequent follow-up pieces.

BAU regular **David Lawrence** was the first to supply me with a speedy Arm-code version of the routine and it forms listing 2 on the yellow pages.

For those who didn't see the original, the idea is simple. Take a triangle and pick a corner to start at. Then, choose another corner at random, move halfway to that corner and plot a point there, then repeat.

Somewhat surprisingly, the result is a beautiful recursive nest of triangles – surprising, because the program itself doesn't appear to be recursive and it potters along in a rather random way.

Listing 2 is a direct implementation of the original algorithm, optimised where possible for maximum speed. You'll notice the gasket is plotted the other way up because it is more natural when poking the screen directly to treat the top left-hand corner as the origin. The random number is generated using the standard method given in the Programmer's Reference Manual (rather unexpectedly located in the Sound section).

One problem with plotting the gasket is knowing when to stop! Like all fractal images, it is of infinite detail, the only limitation being the resolution of the screen.

There are various possibilities when it comes to choosing a stopping point. Listing 2, like Mat's original, plots a fixed number of points (250,000 in fact) and this is stored at number%, so may be changed.

Listing 3 uses a different criterion when deciding to stop. A counter is maintained, starting at 0. Before each point is plotted the screen is examined to see if the pixel has already been set. If so, the counter is incremented; if not it is reset to zero. When the counter reaches a preset maximum (contained in the variable maxsame%) plotting stops. In this way the detail in which the gasket is shown relates more to the resolution of the screen.

With maxsame%=256, the time listing 3 takes to plot the gasket is typically 0.8sec on an Arm 2 machine (as opposed to 1.9sec for listing 2).

Reducing maxsame% to 16 greatly reduces the detail, but the time zooms down to about 0.1sec. (The function is random so times can only be averages!)

The next stage is animation and for this you must use a memory-efficient two colour mode, such as 0, rather than the extravagant mode 15 used by the earlier listings.

The plot routine used by listing 4 is slightly more complicated but straightforward enough.

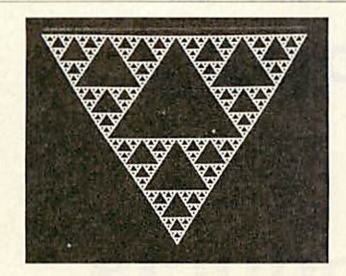
A small block copy routine is used to save the pictures. These are copied directly from the screen to a DIMmed area of memory and back again at playback time.

Multiple load and store commands are used so the time to save or load a mode 0 screen is quite negligible.

The maximum number of frames that may be stored is calculated from the available memory and shown at the start.

Again, you may alter the value of maxsame% to change the detail and time taken. Press SPACE to reverse the direction of animation and single presses of + or - will alter the speed and allow you to look at what's going on in more detail.

his regular bounty of advice, hints, tips and programming snippets



It may seem a lot of trouble to go to in order to produce the finished result. Indeed, much the same effect can be produced recursively using a simple Basic procedure. One is given as an example and you'll find it as listing 5. Here the depth of recursion is the limiting factor.

However, Sierpinski's method has two distinct points in its favour. Firstly, the beauty of the idea is the randomness and non-recursive nature of the procedure. The most imaginative of programmers would find it hard at first sight to predict the picture produced.

Secondly, the way in which the gasket is plotted lends itself to smoother animation. Run listing 5 and you will notice a significant jump when an extra layer of detail appears.

PATH-OLOGY

Pathnames, aliases and system variables in general can be tricky items. They don't often behave as you might expect.

Most readers will be familiar with system variables. Type *SHOW for a complete list: some are strings, others have numeric values.

Some contain useful information (eg, Sys$Time), others reflect options chosen by the user (eg, Copy$Options) and yet more are used to deal with loading and running files of different types.

Variables are also used by the desktop applications to keep track of directories, system resources, fonts, and so on. System variables are usually created and deleted using star commands. These call SWIs "OS_SetVarVal" and "OS_ReadVarVal" which do the work.

To create a variable or change its value three commands are provided: *Set Fred This is a string simply defining a variable – in this case as a string. The command: *SetEval Fred 2+2 will define Fred as a numeric variable with value 4. It's like a *SET with a *EVAL combined.

Another command *SetMacro is used to prevent the definition given being evaluated immediately. If your variable name begins with Alias$ then it has a special meaning. The command: *Set Alias$Details Info |<%0> creates an alias for the *INFO command, so *DETAILS has exactly the same effect. The %0 means 'any following parameters', so: *Details $.Library.* is translated as: *Info $.Library.* and so works correctly. The | before the <%0> prevents immediate evaluation, rather like using *SetMacro as opposed to *SET.

As if this weren't complicated enough, the part of the operating system dealing with files makes special use of certain variables.

Typing *SHOW will reveal many variables of the form Alias$@RunType_XXX and Alias$@LoadType_XXX. These are used to ensure that running or loading a file has the correct effect. Applications make use of this facility.

For example, *!Paint* will alter Alias$@RunType_FF9 so when a sprite file (type &FF9) is double-clicked, *!Paint* loads itself.

To top it all, there is one further extension of the alias idea that can be used in star commands.

This allows you to run programs on a different filing system from the currently selected one, or issue commands from a specific module. The original idea came from the Master OS.

If you are currently using DFS you could run a program Prog on an ADFS disc by typing: *-ADFS-Prog. Although for compatibility this syntax is still supported, the preferred form is now: *ADFS:Prog. The name before the colon needn't be that of a filing system.

Most commonly, the pathname of a directory is stored in a variable with a name of the form DirName$Path. That directory can then be referred to using the syntax DirName: in star commands or even in Basic.

The most important example is System$Path which is used to point to system resources (often the directory $.!System). A module can be loaded with the command:

```
*RMLoad
System:Modules.ModName
```

which is neater but identical to:

```
*RMLoad <System$Path>
Modules.ModName
```

You cannot type a command like: *CAT System: and expect to get a sensible result. The main reason for this is that path variables are not simple aliases. Indeed, they may contain a list of directory names – not just one.

The path variable Run$Path is used whenever you try to run a file. The current directory is searched and then the current library. You could define it with:

```
*Set Run$Path ,%.,$.
```

in which case the root directory would also be searched.

£15 ACID RAIN

This graphic demo is from **Bryan Cloud** of Gloucestershire.

Rather than describe the effect, it's easier just to type in listing 6 and run it. You'll need 160K or more of screen memory configured. The demo also works best if the outline font NewHall.Bold is available. If you have another font simply change the name in font$. If the program can't find the font given, it defaults to using a blown-up version of the standard 8x8 font, so all is not lost.

The main work is done by machine code of course. 'Acid drops' are created randomly in the top area of the screen and move down, leaving a trail. The trail is created by back-tracking along a drop's path. Sixteen shades from black to white are used to create a convincing trail. As a drop moves down, the text message (which is plotted on another, hidden screen) 'burns' through. Exactly 320 drops appear – one for each pixel across the screen, so the message is always completely revealed.



OPTIONAL EXTRA

The Options submenu that can be brought up from the main Filer menu contains a meagre two items – Confirm and Verbose. New users might well suppose that these are the only two available.

However, when copying or wiping files, the user has much more control. Type *Help Copy or *Help Wipe and you will see a list of parameters that can follow these commands. All consist of a single letter. An example of what can be done is:

```
*Copy adfs::4.$ ram:$ T F
```

which will not copy any files at all but will duplicate the directory structure of ADFS disc 4 on the Ram disc. You can use these options in the desktop without having to resort to typing star commands.

The variable Copy$Options contains the default settings of the parameters that *COPY can take. Typically, these might be:

```
A C ~D ~F ~L ~N ~P ~Q
~R ~S ~T V
```

By typing the command:

```
*Set Copy$Options A C ~D
~F ~L N ~P ~Q ~R ~S ~T ~V
```

you disable the 'verbose' option and enable the 'newer' option, so only files with more recent datestamps are copied.

A similar variable Wipe$Options exists for *WIPE parameters. It can be useful to enable the F option in Wipe$Options since the occasional locked file can prevent you deleting a directory. If you do enable F, please be careful though!

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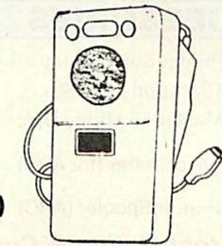
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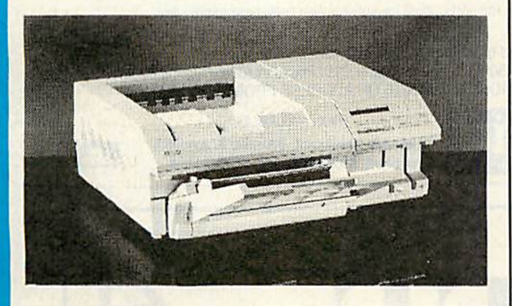
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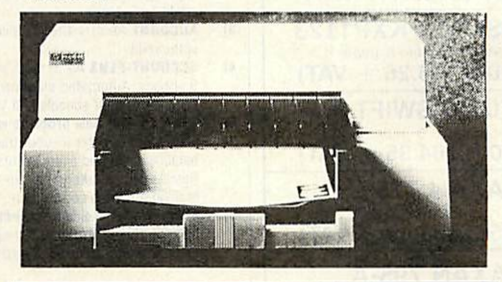
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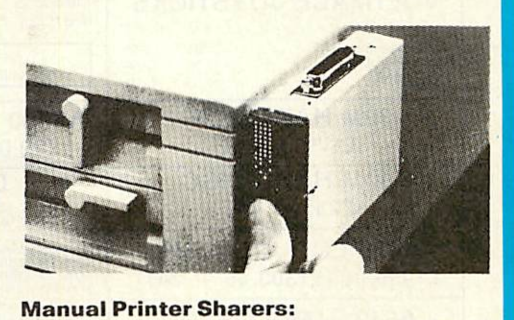
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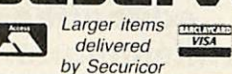
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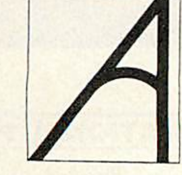
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KX-P4450i	Pana	£1275
– 1Mbyte upgrade		£299
Laser Direct Qume	CC	£856
Laser Direct LBP-4 Card	CC	£321
Laser Direct LBP-8 8 ppm 600 dpi including toner	CC	£1299
LBP-4 4 ppm	Can	£750
LC24-10 32k ram card	Sta	£61
Swift 24 Colour	Cit	£279
Archimedes parallel printer cable		£8

MONITOR

Multivision 795	Tax	£479

SCANNERS

i-Scan	Irl	£587
Scan-Light A4	CC	£369
– as above + Sheet Feeder		£460
Scan-Light Junior	CC	£175
– A3000 version (internal)		£175

UPGRADES

Fitting extra unless otherwise stated
† Fitting requires expertise

A3000 2Mb	Ato	£69
A3000 2Mb	Ife	£69
A3000 4Mb	Ato	£239
A3000 4Mb	Ife	£243
A310 2Mb †	Ife	£215
– as above including fitting		£259
A310 4Mb †	Ife	£299
– as above including fitting		£345
8Mb A400/1 / A440 / R140	Ato	£699
ARM3	Ale	£400

FUNCTION KEY STRIP ORGANISER

Arckey	ICS	VO £3
– quantity of 4		VO £10

KEYBOARD COVERS

Seal 'n Type (spill-proof)		
– Archimedes	Kad	£14
– A3000	Kad	£14

ICS FONTS

1st Word Plus **First Fonts**
PipeDream **PipeDrivers**
Wordpower **Power Fonts**

Please tell us which of the above you need and specify your printer make and model. A more detailed list of fonts is available.

Site licence £50
For multiple use of First Fonts or PipeDrivers. (Power Fonts are covered by a Wordpower site licence).

Symbol sets
e.g. Chemistry, Czech, ICS1 (Forms Design), ICS2 (IBM characters), Latin 1 (includes French, German, Italian, Spanish), Latin 2, Latin 3 (includes Esperanto), Latin 4, Mathematics & Physics, Russian
– for dot matrix £19
– for laser £29

24-pin & HP laser typefaces
Bodmin, Neston, Old English, Personal, Royden, Shadow and Initials, Universal 8pt, Universal 10pt, Universal 12pt, Weimar Fraktur
– 24-pin: any 3 faces £29
– laser: any 3 weights £29

Star LC-10 typefaces
Black, Caldy, Outline, Pensby, Raby, Shadow, Universal
– any 4 £19
– all 7 £29

PipeDriver Dot 1 £10

Powerfont NTQ £13
Provides near letter quality on ordinary 9-pin printers. Required for some Power Fonts.

KEY TO MAKERS

Ace	Ace	Cla	Clares	Mit	Mitre
Aco	Acorn	Col	Colton	Min	Minerva
Ale	Aleph One	CW	Computerware	Oak	Oak
Apr	Apricote	Dab	Dabs	Pana	Panasonic
Arm	Armadillo	Dat	Data Store	Pand	Pandora
Arn	Arnor	Dig	Digital Services	Ser	Serial Port
Arx	Arxe	Emr	EMR	Sha	Sharp
Aut	Autodesk	Eps	Epson	Sil	Silicon Vision
Bee	Beebug	ICS	Ian Copestake	Sim	Simtron
Cal	Calligraph	Ife	IFEL	Sta	Star
Can	Canon	Irl	Irlam	Tax	Taxan
CC	Computer Concepts	Kad	Kador	Tec	TechSoft
Cir	Circle	Lin	Lingenuity	4ma	4Mation
Cit	Citizen	Lon	Longman Logotron	4th	Fourth Dimension

In the News



DRAWBENDER will make Draw files follow a shape of your choice. A useful addition or cheap alternative to Poster, available with or without a set of three decorative fonts. The example above was made using DrawBender with FontFX.
We will send a £25 voucher to the purchaser who thinks of the best new name for it!

EQUASOR

$$m = \sum_{m=1}^{1/2} \left| \frac{AAA^{[2+m^{m+1}]}A}{\sqrt{b-C-c+d_{k-1}}} \right| + n_i$$

This equation building application, with its own mathematical, Greek and other symbols, is now available from stock.

WORDPOWER

Still the best for the Electron, Master and BBC.
"I have yet to find a word-processor that gets close to it for usability and quality of output" said BEEBUG recently.

SCHEMA IN STOCK!

RISC User decided that this spreadsheet "has to be the first, if not the only choice". We now have the full (very stylish) package in stock at £96, complete with manual.

SQUIRREL

You would be nuts not to order this new database from Digital Services at our special offer price of £109! Delivery is expected in January.

BASIC Editor and Toolkit

BET

BBC, Master and Electron users will find BET makes the creation and editing of BASIC programs a real pleasure and encourages the development of a good programming style (Archimedes owners will envy its facilities). Full details on request.

CITIZEN SWIFT 24

For a limited period we are offering the colour version of this printer for only £279!

MISMATCH

A delightful new version of the Pelmanism memory game for all age groups. Excellent graphics and (controllable) sound. An ideal introduction to the Archimedes for five-year-olds. Grown-ups will find it addictive but good for the mind!

PIPEDRIVERS

If your dot matrix printer has more features than PipeDream knows what to do with, you need Pipe-Driver Dot 1. It provides access to resident and download fonts, ink colours, variable print size and line spacing etc.
Like our **First Fonts** for 1st Word Plus and **Power Fonts** for Wordpower, PipeDrivers can make foreign language and scientific word-processing a pleasure. And our 24-pin and LC-10 typefaces will brighten your output at full printer speed.

ARCKEY

With more applications on the market a function key strip organiser is indispensable. Arckey users do it without glue! Suitable for BBC and Master too.

POSTER

Use it on its own or with any DTP program to produce endless special effects at any size. Our price includes a site licence, a range of clip art and borders, and 20 fonts which can also be used with other programs.

TASK AND WINDOW ORGANISER

TWO can group a number of tasks together and start them up with one double-click on the mouse. Applications can be run, files loaded, directories opened, and star commands executed.

Up to 42 task groups may be defined very easily and listed on the screen when the computer starts up. A great help when inexperienced users need access to the system, and a welcome time-saver for old hats.

TWO will instantly re-arrange windows in rotating stacks, piles or a space of their own. No more hunting for the missing one! TWO will also save configuration settings, set Copy and Wipe options, or blank the screen after a specified period of inactivity.

New from Ian Copestake Software £19 + VAT Sites £60

Getting the ideA

At last there is a high-quality range of hard disc upgrades at affordable prices. The *ideA* range from ICS.

For those who haven't heard, the *ideA* is a brand new hard disc interface for Archimedes and A3000 computers. 'IDE' stands for Integrated Drive Electronics. As the name suggests IDE hard discs have sophisticated electronics built into them, allowing the computer interface to be simpler, cheaper and more reliable. Transfer and access speeds can also be enhanced.

Most IDE discs are auto-parking, and some have the ability to switch themselves off to save power during periods of inactivity.

Now for the first time we can offer Archimedes users products previously available only in the PC world.

Although the *ideA* is new, you can use it just like the familiar ADFS. All properly written software will work as usual and there is no conflict of *ideA*s with existing ADFS or SCSI drives. PC partitioning is fully supported.

Fitting a hard disc in an A300/400 series computer is straightforward and clear instructions are provided. All discs supplied by us are tested and formatted. The complete upgrade kit includes a disc cradle and fan, and is called for example **IDEARCIN40**. The 40 at the end indicates the hard disc capacity: our Price List shows the sizes currently available (others will be added soon).

A backplane is not needed on the A310 unless you wish to connect other podules. In that case you must use a high-quality four-layer backplane such as the one we offer.

One of the most exciting products in the *ideA* range is a fully internal hard disc upgrade for the BBC A3000. This is ideal for schools or any location where space is at a premium or where security and portability are important. The **IDEA3IN20** uses one of the latest 2½" 20 megabyte low-power discs (ask for the latest news about larger capacities). Your floppy disc is not affected by this upgrade.

INTERNAL A3000 HARD DISC

Although installing the A3000 upgrade is quite easy, it could be dangerous for inexperienced users to open the computer. We have therefore priced this particular product to include collection and fitting at our service centre. (Please make sure we have your daytime and evening telephone number so we can arrange this). Deduct £10 if you do not require the A3000 fitting service.

Ian Copestake Software will be producing a range of other accessories for the A3000. First to arrive is **IC PLINTH**, a steel monitor stand to which you can later add **IC HOUSE**, our hard and floppy disc drive housing (ready soon). The Plinth can take a variety of 14" monitors yet occupies less than 18" from front to back when in use. It has anti-slip feet and may be fixed to a desk. Assembly is easy. There is full access to the mains switch and floppy disc drive, while the reset switch is accessible but guarded.

The *ideA* hard disc controller is also available on its own for those who are confident of choosing a suitable IDE hard disc themselves. The product reference is **IDEARC**. We must point out that we can only accept responsibility for the performance of the *ideA* interface with discs we have tested.

ideA PRICE LIST

IC HOUSE			T.B.A.
IC PLINTH			£21
IDEA3IN20	23ms*	incl fitting	£499
IDEARC			£110
IDEARCIN40	28ms*		£349
IDEARCIN80	19ms*		£499
IDEARCIN135	28ms*		£699
IDEARCIN200	15ms*		£899
IFEL 4-slot 4-layer Backplane			£57

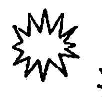
*Average access times, subject to improvement

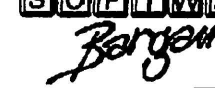
FREE! Hard Disc Companion
worth £35 when you spend over £350 on an ideA hard disc (limited period, direct sales only)

Ask about our special evaluation offer for LEAs and authorised Acorn dealers

051-648 6287







AND Mercury Games



Software Checklist

Archimedes

TITLE	SRP	SALE
1st Word Plus (V2)	91.94	79.95
8bit Sound Smp. + Midi	224.25	169.95
8bit Sound Smp Mono	155.25	124.95
Acheton/Kingdom of Hamil	19.95	15.95
Alerion	14.95	11.95
Alien Invasion	14.95	11.95
All in Boxing	14.95	11.95
Alpha Base	49.95	39.95
ALPS System	32.00	26.95
Amazing Ollie (Educ)	16.04	14.95
Ancestry	79.95	69.95
Ansi C (Release 3)	171.35	144.95
Apocalypse	29.95	29.95
ARC-COMM	33.35	29.95
ARC-PCB	195.00	175.95
ARC-PCB Professional	375.00	319.95
Arc Games Controller	40.24	33.95
Arcade 3 Compilation	14.95	11.95
Arc Pinball	24.95	19.95
Arcade Soccer	14.95	14.95
ArcDFS	29.95	26.95
Arcendium	14.95	11.95
Arch Operating System	21.95	–
Arch Assembly Lang	21.95	18.95
Arch, Basic Compiler	99.95	89.95
Arch, Joystick Interface	23.95	19.95
Archimedes First Steps	9.95	7.95
Arclight	50.00	39.95
Arcmonitor	24.95	19.95
Arcterm 7	79.95	69.95
Arctrivia	24.95	16.95
Armadeus	79.95	69.95
Armadeus Sound-Samp. Board	149.95	139.95
Artisan 2	59.95	49.95
Artisan 2 HP Driver	14.95	11.95
Artisan 2 Star LC10 Driver	14.95	11.95
Assembler	228.85	199.95
Atelier	99.95	89.95
Auto sketch V2	90.85	79.95
Avon	19.95	17.95
Ballarena	19.95	15.95
Battletanks	14.95	11.95
Blowpipe	19.95	15.95
Brixx	17.95	14.95
Bug Hunter	17.95	15.95
Bug Hunter in Space	17.95	15.95
Bumper Disc 1 (Educ)	19.95	15.95
Bumper Disc 2 (Educ)	19.95	15.95
Cambridge Pascal	79.95	69.95
Casino	24.95	19.95
Caverns	19.95	15.95
Christmas Box Compilation	19.95	15.95
Chocks Away	24.95	
CIS Utilities 2 (2 discs)	16.95	14.95
CIS Utilities	11.95	9.95
Coffee (educ)	32.14	29.95

TITLE	SRP	SALE
Conqueror	24.95	19.95
Control Panel	17.20	11.95
COPS	19.95	15.95
Corruption	29.95	14.95
Crisis	17.95	14.95
Data Vision	149.95	129.95
Delta Cat (Joystick)	29.95	26.95
Deltabase	29.95	24.95
Desktop Office	129.95	109.95
Desktop Publisher	171.35	139.95
Disc Tree V.2	49.95	41.95
Drop Ship	19.95	19.95
Dust Cover Archimedes	14.95	9.95
Dust Cover A3000 Keyboard	5.95	3.95
E-Type	19.95	19.95
E-Type Designer	19.95	19.95
E-Type Extra 100 miles	16.95	16.95
Easiword	39.95	33.95
Euclid (RISC-OS)	70.00	59.95
Family Favourites	19.95	15.95
Flight Path (Educ)	32.14	29.95
Film Maker	99.95	84.95
Financial Accountant	275.00	234.95
Fireball 2	24.95	19.95
Fish	29.95	14.95
Flexifile	149.95	129.95
Font FX	9.95	7.95
Font Starter Pack	51.75	46.95
Fortran 77 (Release 2)	113.85	94.95
Freddy's Folly	14.95	11.95
Freddy Teddy	19.95	15.95
Fun School 2 (0-6 yrs)	19.95	15.95
Fun School 2 (6-8 yrs)	19.95	15.95
Fun School 2 (8+ yrs)	19.95	15.95
Fun School 3 (0-5 yrs)	24.99	19.95
Fun School 3 (5-7 yrs)	24.99	19.95
Fun School 3 (7+ yrs)	24.99	19.95
Fun School 3 for Archimedes – release postponed; please call for details		
Gamma Plot	69.95	59.95
Genesis	99.99	84.95
Gerber Plot	125.00	104.95
Giant Killer	17.50	14.95
Graph Box V2	79.95	69.95
Hearsay	69.00	59.95
Herewith The Clues	24.95	19.95
Holed Out	19.95	19.95
Holed Out Extra Courses 1 & 2 (each)	16.95	16.95
Hold Out Designer	19.95	19.95
Home Accounts	49.95	39.95
Hostages	19.95	15.95
Hotlink Presenter	57.49	49.95
Hoverbod	14.95	11.95
Ibix the Viking	19.95	15.95
Impression 2	194.35	164.95
Impression Junior	103.44	89.95
Inertia	19.95	15.95

TITLE	SRP	SALE
Instigator	49.95	41.95
Inter-chart (Disc)	21.85	18.95
Inter-sheet 11 (Disc)	33.35	29.95
Inter-word (Disc)	33.35	29.95
Interdictor 2	34.95	29.95
Investigator Rel. 2	27.95	24.95
Iron Lord	19.95	15.95
ISO Pascal (Release 2)	113.85	99.95
Jet Fighter	14.95	11.95
Knowledge Organiser	59.95	49.95
Last Days of Doom/Hezarin		15.95
Let's Spell At Home	24.95	19.95
Let's Spell At The Shops	24.95	19.95
Logistix . . . (includes manuals)	113.85	99.95
Logistix Manual Part 1	10.00	8.95
Logistix Manual Part 2	10.00	8.95
Mad Professor Mariarti	19.95	15.95
Maddingly Hall	14.95	11.95
Mah-Jong Patience	19.95	15.95
Man at Arms	19.95	19.95
Manchester United	24.99	19.95
Maths Pack 1 (5-7 yrs)	11.95	9.95
Memory Magic	15.99	13.95
Micro Drive	19.95	15.95
Missile Control	14.95	11.95
MicroDrive Ext. Course USA	14.95	11.95
Mogul	20.00	16.95
Mouse/Joystick Splitter	19.95	17.95
Multistore VII	299.00	249.95
Nevryon	19.95	19.95
Newhall Font starter pack	51.75	46.95
N-Store	24.95	21.95
Ollie Octopus Sketchpad	16.04	14.95
Orion	14.95	11.95
Ovation	113.85	99.95
Overload	14.95	11.95
PC Access	39.95	33.95
PC Emulator	113.85	113.85
Pipedream 3	169.05	144.95
Pipemania	24.99	19.95
PIPP	39.95	33.95
PON	17.95	15.50
Powerband	24.95	24.95
Presentation System	79.95	69.95
Presenter 2 (RISC-OS)	45.94	39.95
Pro Artisan	99.95	84.95
Protext V5	149.95	129.95
Pysanki	19.95	19.95
Rhapsody in Blue	49.95	39.95
Realtime Solids Modeller	195.00	164.95
Redshift	17.95	14.95
Render Bender	79.95	69.95
Render Bender – Animated Discs	14.95	11.95
Repton 3	19.95	15.95
Return to Doom Trilogy	19.95	15.95
Risc Basic Compiler	149.95	129.95

Archimedes

TITLE	SRP	SALE
Risc Forth	149.95	129.95
RISC-OS Prog Ref Manual		79.00
RISC-OS	33.35	
(Customer responsible for installatation)		
RISC Type (Typing Tutorial)	19.95	15.95
RoboLOGO	99.95	84.95
Rotor	24.99	19.95
Scan Light Jnr. A3000	228.85	199.95
Scan-Light Senior	458.85	434.95
Schema	129.95	109.95
Search & Rescue (educ)		29.95
School Administrator	79.95	69.95
Sigma Sheet	69.95	59.95
Stappit	19.99	15.95
Software Dev. Toolbox	228.85	194.95
Solid CAD	149.95	129.95
Solids RENDER	149.95	129.95
Solid TOOLS	375.00	319.95
Sound Synth	49.95	41.95
Spellbook (4-9 yrs)	24.95	19.95
Spellmaster (Disc)	33.35	29.95
Splice	30.00	24.95
Sporting Trinagles	24.99	19.95
Square Route	19.95	15.95
Super – Dump	24.95	19.95
Superior Golf	19.95	15.95
Super – Plot	39.95	34.95
Supersound Creations1	9.95	7.95
Supersound Creations 2	9.95	7.95
Symbol Font Pack	51.75	46.50
System Delta Plus	79.95	69.95
Tactic	19.95	15.95
Talisman	14.95	11.95
Tempest	129.95	109.95
The Art Machine Pk 1 or 2 (each)	28.75	24.95
The Olympics	19.95	14.95
The Pawn	29.95	19.95
The Real McCoy	29.95	29.95
The Wimp Game	19.95	19.95
Things to do with numbers	24.95	19.95
Things to do with Words	24.95	19.95
Thundermark	14.95	11.95
Timewatch	29.95	24.95
Tiny Logo/Tiny Draw	29.95	24.95
Tracker	49.95	41.95
Trivial Pursuit	29.99	24.95
Tween	30.00	24.95
Twin	33.35	29.95
Twinworld	19.95	15.95
U.I.M	29.95	29.95
U-Connect	59.95	49.95
View 3.0	59.80	49.95
White Magic Vol 1 & 2 (each)	19.95	19.95
Wordwise A-Plus	33.35	29.95
Worldscape	19.95	15.95
Zarch	19.95	15.95

Send SAE for our full Archimedes software catalogue

fun school 3 / fun school 2

BBC/ELE CASS SRP £9.95 Offer Price £7.95
BBC 5.25" DISC SRP £12.95 Offer Price £9.95
(All prices are per age-range: 0-6yrs, 6-8yrs or 8+yrs)

UNDER 5's Includes:-

- COUNTING - Help teddy reach the jar of honey by counting up to nine
- LETTERS - Join in all the fun at the alphabet fair by pairing large letters
- MATCHING - Pair up the shapes to fill teddy's piggy bank with money
- ACTIONS - Make teddy jump, hop, sleep, juggle, skip, eat & more
- PAINTING - Colouring fun down on the farm with all the pigs & cows
- GALLERY - Learning to read is really easy in the Fun School Gallery.

5 -7 YRS Includes:-

- TOYSHOP - Spend your pocket money wisely in the shop
- TIME - Tell the time & watch the cuckoo clock come alive
- FUNTEXT - Explore the Ceefax-style database & take the challenge
- COLLECT - Guide the frog from log to log to create & solve the sums
- ELECTRICITY - Fix the incorrect circuits to set the bell ringing
- JOURNEY - Travel round the village & learn about directions

OVER 7 YRS Includes:-

- TREASURE SEARCH - Follow compass directions to find the jewels
- WORD SEARCH - Pick out the words cleverly hidden in the large grid
- ROBOT DRAW - Create beautiful patterns & learn how to program
- PLANETARY MATHS - Solve the sums before they hit the forcefield
- SENTENCES - Correct spelling, punctuation & grammar mistakes
- DATABASE - Store information, sort it, search it, then test yourself

Release postponed - now due approx February 1990 - Prices per level

SRP BBC/ELE Cass £12.99 **Sale 9.95**

SRP BBC 5.25" Disc 16.99 **Sale 13.95**

SRP ARC Disc (Release postponed - please call for news update)

£24.95 **Sale 19.95**

(Cheques cashed /credit cards debited only on day of despatch)

RECENT RELEASES

TITLE	BBC or ELE CASS	BBC DISC	CPCT DISC
A QUEST. OF SPORT	8.95	10.50	14.95
ARCADE SOCCER	9.95	12.95	-
ArcPinball	-	9.95	10.95
E-TYPE	9.95	14.95	-
ELITE	8.95	11.95	15.95
EXILE	9.95	11.95	15.95
HOSTAGES	7.95	9.95	11.95
HOLED OUT	12.95	14.95	-
KLAX (BBC only)	7.95	12.95	-
LAST NINJA 2	7.95	9.95	11.95
MASTER BREAK	7.95	9.95	11.95
PERPLEXITY	7.95	9.95	11.95
PIPEMANIA	7.95	11.95	11.95
REPTON INFINITY	8.95	11.95	15.95
SIM CITY	9.95	11.95	15.95
SPORTING TRIANGLES	7.95	9.95	-
TANK ATTACK	8.95	11.95	-
PLAY IT AGAIN SAM Compilations 1 to 10 (Each):-	6.95	8.95	10.50
PLAY IT AGAIN SAM Compilations 11 to 14 (Each):-	7.95	9.95	11.95
Superior Col 1 (BBC only)	6.95	8.95	10.50
Superior Col 2 (BBC only)	6.95	8.95	10.50
Superior Col 3 (Ele only)	6.95	-	-

Send SAE for full BBC, Electron or Compact catalogue

JOYSTICKS

Joysticks for BBC/B+/Master 128 & Electron Plus 1

Delta 3B Twins

£19.95

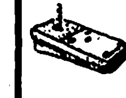
2 Analogue, light spring action joysticks wired to one plug



Delta 3B Single

£13.95

Analogue, light spring action joystick; can be used as either left or right-handed



Educational Software for the BBC

Ollie Octopus Sketchpad 4+ Yrs £12.50
Amazing Ollie 4+ Yrs £12.50
Flight Path 9+ yrs £25.00
Search & Rescue 9+ yrs £25.00
Coffee 9+ yrs £25.00
(5.25" disc only - state 40t or 80t)

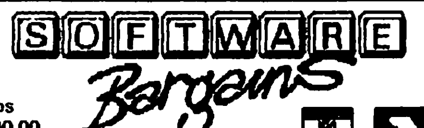
Full details available on request

Printers ... Printers ... Printers ... Printers

KX-P1081	Panasonic 9pin 80 col Dot Matrix	**£159.95**	**SP-200**	Seikosha 9pin Dot Matrix	**£179.95**
KX-P1180	Panasonic 9pin 80 col Dot Matrix	**£169.95**	**SL-92**	Seikosha 24pin Dot Matrix	**£269.95**
KX-P1124	Panasonic 24pin 80 col Dot Matrix	**£259.95**	**MP-1350**	Seikosha 9pin Dot Matrix	**£314.95**

(Prices include VAT, printer cable & courier despatch - (UK mainland only) Please state for which computer you require the printer)

* Please add 95p P&P (Europe £2.50, Outside Europe £4.50)
* All prices include VAT (except books which are zero rated)
* Goods despatched within 48hrs (subject to availability)
* Out of hours answerphone .. 0532 436300
* Educational Discount of 30% off SRP available on Archimedes software; Official Order No. required - minimum order value £30.00



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Telephone 0532 436300

Please make cheques payable to SOFTWARE BARGAINS

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(A member of the Jessa group of Companies – Established 1972)



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All prices exclusive of VAT; subject to change without notice & available on request.

The sign of Quality

Archimedes micro

System	Basic	Mono	Colour	Multiscan
410/1	£1099	£1159	£1288	£1448
420/1	£1299	£1359	£1488	£1648
440/1	£1699	£1759	£1888	£2048
540/1	£2995	£3065	£3184	

Archimedes A3000



- A3000 Microcomputer **£599**
- A3000 + Learning Curve pack **£699**
- 3.5" External Drive £99
- Monitor Stand £16
- External Podule Case £13
- Serial Upgrade £17
- Technical Manual £29
- SCSI Card £149
- Dust Cover Micro only £5
- Dust Cover for Micro + Monitor £9
- User port/MIDI upgrade £45
- UHF TV Modulator £30

Unbeatable Sale Offers on Archimedes Micro

When you purchase an Archimedes Micro from Watford, look what you get FREE with it

Micro	Free Offer
A410/1	Upgraded to 2MB RAM & a 20MB Hard Disc, (A420)
A420/1	Upgraded to 4MB RAM 40MB Hard Disc (A440), MK II Learning Curve pack and Acorn DTP pack
A440/1	High Res 14" Multiscan Colour Monitor
540/1	High Res Multiscan Monitor & Panasonic KX-P1180 Printer
A3000	Upgraded to 2 Megabyte of RAM

+ 12 months FREE On-Site Maintenance
(P.S. Instead of the above Hardware upgrades on A410/1 & A420/1, we will fit the 30MHz Turbo Board if required. Please specify your requirement when ordering.)

Archi Accessories

- NEW Multitasking RISC OS £29
- 3.5" 800K 2nd Floppy Drive (305/310) £118
- 5.25" 800K external Floppy Drive £85
- I/O Podule (with Analogue port, User port, & 1MHz bus) £76
- MIDI add-on to I/O Podule £29
- MIDI Expansion Card £65
- Sound Sampler Mono (Armadillo) £129
- Sound Sampler Stereo (Armadillo) £166
- Sound Sampler Stereo /Midi (Armadillo) £186
- Chromalock Podule (Wild Vision) £275
- Econet Network Board £44
- Archimedes IEEE Interface Adaptor £269
- Dual RS232 Podule £195
- 16 bit parallel I/O Card £195
- NEW – Archi MK II Replacement Mouse £32
- PC Emulator NEW Faster Version £62
- Software Developers Toolbox £149
- Floating Point Unit £455
- SCSI Adaptor Expansion Card £162
- Keyboard Extension Lead £6
- 2 Podule Backplane £25
- 4 Podule Backplane £38
- Fan for above backplanes £8
- Risc Os Extras Software Disc £5
- Smoked Perspex Low profile Keyboard Cover £8
- Ethernet Card £220

VISA / Access

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

8 Meg RAM Upgrades

- **R810** – A410/1 upgraded to 8MB £910
- **R820** – A420/1 upgraded to 8MB £859
- **R840** – A440/1 upgraded to 8MB £749
- **R814** – R140 upgraded to 8MB £749

Turbo Charge Your Archimedes

Increase the speed of your Archimedes by a factor of THREE to SIX times (depending on the software you are running), with Watford's ARM3 Upgrades.

- **ARM-3** 20MHz Upgrade Board £325
- **ARM-3** 30MHz Upgrade Board £375
- **MEMC** 1A Upgrade £42

(ARM 3 price includes a FREE Chip extraction tool)
(Special Offer – If purchased together with an Archimedes Micro, then not only will we fit the card Free of Charge but we will also reduce the price by £40 i.e. You pay only £309 for ARM3 20MHZ & £359 for ARM3-30MHz)

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

- **R302**-A3000 – to 2MB RAM Upgrade £62
- **R304**-A3000 – to 4MB RAM Upgrade £179
- **R311**-A305 – to 1MB RAM Upgrade £75
- **R312**-A305/310 – to 2MB RAM Upgrade £245
- **R314**-A305/310 – to 4MB RAM Upgrade £435
- **R412**-A410/1 – to 2MB RAM Upgrade £49
- **R413**-A420/1 – to 4MB RAM Upgrade £95
- **R414**-A410/1 – to 4MB RAM Upgrade £137

Archimedes Hard Disc

Watford's Hard disc drives for A310 & A410 series fit internally into the space provided. The 'simple to follow' fitting instructions supplied makes drive fitting very easy. All disc drives are self parking. 40Meg & 53Meg drives are fast 24mS type, while 20MHz are 28mS.
P.S. A310 upgrades require a backplane and a fan.

- **3HDP** – Hard Disc Podule only £135
- **3HD20** – 20Meg H' Disc + Podule for 310 £299
- **3HD40** – 40Meg H' Disc + Podule for 310 £389
- **3HD50** – 53Meg H' Disc + Podule for 310 £474
- **4HD20** – 20Meg Hard Disc for 410 £165
- **4HD40** – 40Meg Hard Disc for 410 £269
- **4HD50** – 53Meg Hard Disc for 410 £399
- A3000 20Meg Hard Disc + Podule £359
- A3000 40Meg Hard Disc + Podule £489

Convert your Archi 410 to a 420 or 440 with Watford's unique Upgrade Kits

- **UP10** – to 2MB RAM + 20MB Hard Disc £210
- **UP15** – to 2MB RAM + 40MB Hard Disc £325
- **UP20** – to 4MB RAM + 20MB Hard Disc £299
- **UP30** – to 4MB RAM + 40MB Hard Disc £415
- **UP40** – to 4MB RAM + 53MB Hard Disc £475

Silicon Vision

Gerber Plot	£95	Super Dump	£22
Risc Basic	£120	ROBO LOGO	£69
Solid CAD	£120	Solids Render	£120
Super Plot	£30	Solid Tools	£279
Arc PCB Professional			£275
Realtime Solids Modeller			£138

Desk Top Publisher

- **Acorn's Archi DTP Package** £125
- **Impression 2 DTP Pack** £139
- **Impression Junior** £79
- **Tempest DTP Package** £95

Archi Wordprocessors

Pendown Archi	£49	Archie Spell Master	£39
Wordwise + Disc	£24	PD Spellchecker	£40
Image Writer	£25	View	£45
Interword Disc	£24	Graphic Writer	£23
1st Word Plus – 2	£69	EasyWord	£30

Databases

AlphaBase	£36	Multistore	£195
Knowledge Organiser	£45		

Spreadsheets

Intersheet Disc	£24	Viewsheet	£45
Sigmasheet	£55	Schema	£99

Business Graphics

GammaPlot	£39	Sigmaplot	£39
Interchart Disc	£20		

Integrated Packages

- Logistix £79
- Pipedream 3 £120
- Desktop Office – Database, Graphs & Charts, Wordprocessor Spreadsheet, Communications £103

Graphics, Art, Design & Games

GRAPHICS

Atelier	£65
Artisan II	£47
Autosketch II	£68
Craftshop 1 & 2	£28
Euclid 2	£52
Graph Box	£59
Kermit	£46
Mogul	£19
Poster	£79
Pro Artisan	£72
Render Bender	£58
Snippet	£26

GAMES

ArcPinball	£20
Apocalypse	£23
Arcade Soccer	£15
Avon	£16
Ballerena	£15
Battle -Tank	£11
Break 147	£20
Bug Hunter	£14
Casino	£18
Caverns	£14
Chocks Away	£20
Conqueror	£18
Cops	£14
Corruption	£18
Drop Ship	£17
Enthar Seven	£22
E-Type	£17
E-Type Designer	£15
E-Type Extra 100 miles	£15
Freedom Fighter	£21
Holed Out Designer	£16
Holed Out Golf	£15
Hostages	£17
Ibix the Viking	£14
Inter Dictor 2	£27
Jet Fighter	£10
Magpie	£39
Manchester United	£-
Nevryon	£17
Olympics	£15
Real McCoy	£25
Redshift	£14
Return to Doom	£16
Revelation	£54
Repton 3	£15
Rotor	£20
Sporting Triangles	£24
Superior Golf	£15
Talisman	£12
The Pawn	£19
Thundermonk	£11
Trivial Pursuit	£23
U.I.M.	£23
White Magic	£15
White Magic 2	£15
Wimp Game	£18

Miscellaneous

Ancestry	£59
Arccomm Pack	£24
Arcterm 7	£69
Armadeus Sound	£60
BBC DFS Reader	£15
Genesis	£65
Genesis 2	£125
Hearsay Comms Pack	£50
Numerator	£66
Rhapsody in Blue	£42
Toolkit (Clares)	£42

Our Winter Catalogue is now available. Please write in for your FREE copy

LANGUAGES (Archimedes)

ISO-PASCAL; FORTRAN 77	£77 each
ANSI C Release 3	£125
Assembler; LISP or Prolog X	£149 each
LOGOTRON LOGO	£55
ROBO LOGO £49	TWIN EDITOR £25
RISC BASIC £85	BASIC Compiler £77

MINERVA's Archimedes Software

Sigmasheet	£55	Sales Ledger*	£53
Home Accounts*	£36	Purchase Ledger*	£53
Stock Manager*	£53		
Nominal Ledger*	£53	Reporter	£29
Ancestry	£59	Mailshot*	£29
System Delta+	£55	MultiStore	£195
System Delta + Reference Manual			£25
Order Processing/Invoicing*			£53
School Administrator			£118

** Requires System Delta*

NEW Business Accounts Packages
Nominal Ledger, Order Processing/Invoicing, Purchase Ledger, Sales Ledger & Stock Control
Price: **£78** per Module or
£299 for complete package

ULTIMUM – Archimedes A3000 Podule Racking System



THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

The accepted standard for Archimedes computer expansion is the Acorn Podule, designed initially to fit the old 310, and also for the later A400 and A400/1 series micros. The podules fit inside these computers up to four at a time. The A3000 is the little brother of the family, but can only have one podule at a time, plugging into the back of the computer.

Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

Price: £125

By popular demand, we are now able to supply refurbished and fully guaranteed, Acorn range of Micros.
(Please telephone for price & availability)

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.
Only £21

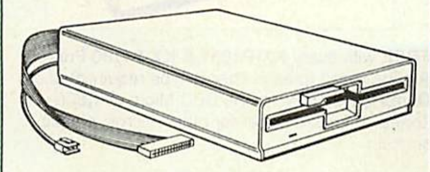
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399** *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during February

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module	£115
Econet Module for the Master	£45
Twin ROM Cartridge for Master	£9
Quad ROM Cartridge for Master	£14
Master Reference Manual I	(No VAT) £14
Master Reference Manual II	(No VAT) £14
Master Advance Ref Manual	(No VAT) £17
64K Upgrade Kit for B+	£32
Acorn 1772 DFS Kit complete	£49
ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
Morley Teletext Adaptor with ATS Rom	£99
Filestore E01S £899	Filestore E40s £749
Filestore E60S £949	Ecolink £270

(Carr. £2 to £7 depending on the weight)

Watford Electronics are Acorn's major Qualified Dealer and Econet Referral Centre. Please telephone our Education Department for all your educational needs.

Archi A4 Scanner

NEW

This new A4 image scanner from Watford Electronics is supplied complete with ROM based podule software. Special features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.

The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.

Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.

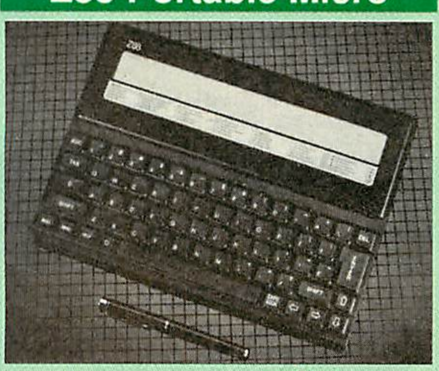
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.

All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

Introductory Prices:

Archi A4 Scanner	£349
Sheet Feeder for above	£95
Scanner + Sheet Feeder	£399

Z88 Portable Micro



Only: **£189** (Carr £4)

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

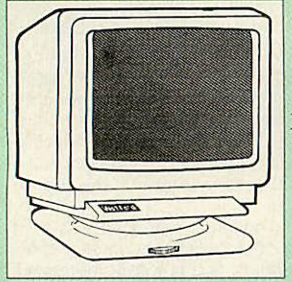
Z88 ACCESSORIES

• 32K RAM Pack or 32K EPROM Pack	£18.00
• 128K RAM Pack or 128K EPROM Pack	£42
• 512K RAM Pack	£175
• Z88 Eprom Eraser Unit	£33
• Z88 Spellmaster for Pipedream	£51
• Z88 Carrying Case	£8
• Z88 Computing Book	£9.95
• AA Nicad Rechargeable Battery	£1.50
• Battery Charger Compact & Fast	£6
• Z88 Serial Printer Cable	£8
• Z88 Parallel Printer Cable	£25
• Z88 to Archi Link	£15
• Z88 to BBC Link £20	• Z BASE £56
• Z88 to PC Link II £30	• Z TAPE £42
• Z88 to Macintosh £52	• Z TERM £42
• Z88 Mains Adaptor £9	• Z88 Modem £149

Be Satisfied Before You Buy

We have on display, various Micros, Printers, Disc Drives, Monitors, etc., on demonstration in our showroom, for you our customers to evaluate before you buy.

Continued→ → → → → → → → → →





Microvitec Monitors

- **1431** – Standard Resolution Monitor £172
- **1451** – Medium resolution, suitable for word processing in mode 0 £215
- **Cub3000** Medium Res for A3000 £195
- **1441** – High res, exceeds the capabilities of the BBC Micro £359
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

Multiscan Colour

- **EIZO** 9060SZ Low Radiation, Antistatic screen, Ultra Hi Res 800 dots x 600 lines. 0.28 Dot £399
- **EIZO** 9070S 16" Low Radiation .28 Dot pitch. As used on Archi 540/1 £599
- **PANASONIC** – 14" Super High Res. 0.29" Dot pitch, non glare screen. Built-in Swivel base **Special £349**
- **TAXAN** 770LR Low Radiation Multiscan £393
- **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen £393
- **TAXAN** 795-A TRINITRON 0.26 Dot pitch 1024 x 768 Non interlaced £475
- **VIDC** Enhancer Board £29

(P.S. VIDC Enhancer board is supplied FREE with every TAXAN 795 Monitor)

Philips

- **BM7502** 12" Hi-res Green Monitor £70
- **CM8833** 14" Med. Res Colour Monitor £173

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £165

Dust Cover for Philips Monitors £6
(Securicor carriage on Monitors £7)

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

Roland Plotters

(Official Roland Appointed Distributor)

DPX 2500	£2389	**DXY 1100**	£538
DXY 1200	£705	**DXY 1300**	£895

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors; all Panasonic, Hewlett Packard (3 months) and all Laser Printers, Roland Plotters and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Hewlett-Packard Printers

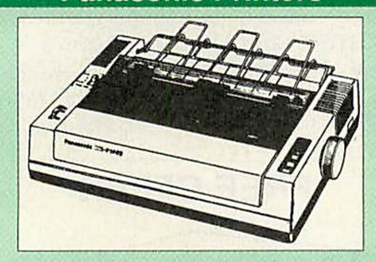
Desk Jet 500	£370	Quiet Jet Plus	£379
Desk Writer	£485	Scan Jet Plus	£725
Desk Jet Cartridge	£15	HP Think Jet	£245
Paint Jet Colour	£649	Rugged Writer	£875
Paintjet XL	£1435		

- Paintjet Cartridges Black **£19;** Colour **£25**
- Desk Jet 500 256K RAM cartridge £129
- HP Epson FX Emulation Cartridge £59

Canon Bubblejet Printers

BJ 10E	£269	BJ 130E	£410
BJ 10E Cut Sheet Feeder	£54		

Panasonic Printers



FREE with every **KX-P1081 & KX-P1180** Printers: A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of fanfold paper for other micros, please specify)

- **KX-P1081** 9pin 80col. 144/28 cps £124
- **KX-P1180** 9pin 80col. 192/38 cps £129
- **KX-P1123** 24pin 80col. 192/63 CPS £169
- **KX-P1124** 24pin 80col. 192/63 CPS £185
- **KX-P1540** 24pin 136col. 240/80 CPS £390
- **KX-P1592** 9pin 136col. 216/45 CPS £219
- **KX-P1624** 24pin 132col. 192/63 CPS £305
- **KX-P1695** 9pin 132col. 330/86 CPS £310

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-P1123/1124 (P36)	£85	KX-P1180 (P37)	£79
KX-P1624/1695 (P38)	£124		

Buffers

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592 £32 **P19** P1124/1180 £55

Integrex Colour Jet

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £19.50
- Black Cartridge £11.25
- Black Textile Cartridge £17
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

Citizen Printers

120D Plus	£99	124D Printer	£169
Prodot 9	£239	Prodot 24	£339
Swift 9	£149	Swift 24	£216

- Prodot Cut Sheet Feeder £120
- Swift 24 Colour Option £32
- Swift 24 Ribbons Black £4 Colour £13

Star Printers

- **LC10** 9pin 80col. 144/36 CPS £118
- **LC10-II** 9pin 80col. 180/45 CPS £139
- **LC15** 9pin 136col. 180/45 CPS £245
- **LC24-10** 24pin 80col. 180/60 CPS £172
- **LC24-15** 24pin 136col. 200/67 CPS £310
- **FR10** 9pin 300/76 CPS 31K 16 fonts £275
- **FR15** Wide carriage version of above £365
- **XB24-10** 24pin 80col. 240/80 CPS £360
- **XB24-15** 24pin 80col. 240/80 CPS £480
- **XB-24** Colour Kit £35
- **LC-200** Colour 9pin 80col. 180/45 CPS £160
- **LC-24-200** 24pin 80col. 222/67 CPS £215
- **LC24-200** Colour 24pin 80col. 222/67 CPS £230

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139
LC24-200	£63		

Serial Interfaces

SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 £49
8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour £29

Buffers

32K Ram Card for LC24-10; 15 & 200 £55
32K Ram Card for XB24-10 & 15 £55

Ribbons

LC10; LC10-II; LC15	Black **£4;**	Colour **£6**
LC-200; LC24-200	Black **£5;**	Colour **£12**
XB24-10; XB24-15	Black **£5;**	Colour **£12**

Laser Printers

Canon LBP-4	4ppm	£695
Canon LBP-8 IIIR	8ppm	£1740
Canon LBP IIIT	8ppm	£1580
Epson EPL7100	6ppm	£735
HP Laserjet IIP**	4ppm	£665
HP Laserjet III	8ppm	£1199
HP Laserjet IIID	8ppm	£1775
Panasonic KX-P4420	8ppm	£699
Panasonic KX-P4450i	11ppm	£1105
Panasonic KX-4455 Postscript	11ppm	£1699
Qume Crystal Print WP+		£749
Qume Crystal Print Ser. 2		£1065
Qume Crystal Print Publisher 2		£1899
Star LP-8 III		£1089
Star LP-8 Star(post)script		£1299

** Lower Paper Cassette Tray & Premier Collection Software, **FREE** with every HP Laserjet IIP printer purchased from us. Offer subject to availability.

Laser Toners

Canon 2 & 4	£60	Laserjet II & IIP	£55
Epson GQ	£18	Laserjet III	£75
Star LP-8	£69	Qume Crystal	£59
KX-P4420/50	£25		

Laser RAM Upgrades

HP Laser RAM		KX-P4420 1M	£249
IIP & III 1MB	£99	KX-P4450i 1M	£299
IIP & III 2MB	£125	KX-P4450i 2M	£575
II & IID 1MB	£102	Star LP-8 1MB	£143
II & IID 2MB	£127	Star LP-8 2MB	£285
II & IID 4MB	£325	Star LP-8 4MB	£429
GQ5000 512k	£99		

Laser Drum & Developer

Epson Drum	GQ5000	£129	EPL7100	£129
Panasonic 4420 Drum		£69	Developer	£59
Panasonic 4450 Drum		£99	Developer	£80
Qume Drum		£76		

Jetpage Postscript Cartridge

for Laserjet II **£369** IID & III **£375**

NEW – HP Laserjet

Various Font Cartridges £69
Superset Font £275

Epson Printers

DFX5000	£1105	LQ850+	£425
DFX8000	£2070	LQ860 Colour	£489
EX800	£405	LQ1050+	£520
EX1000	£535	LQ1060	£606
FX850	£294	LQ2550+	£729
FX1050	£368	LX400	£116
FX1060	£599	LX850	£179
LQ400	£178	SQ850	£459
LQ550	£246	SQ2550	£719

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550	£69
EX800/FX800/850/LQ800/850	£130
FX/LQ 1000/1050/SQ850	£159
LQ 2550 £390 SQ2550	£176

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option £45
- EX800/1000 Colour Ribbon £14
- LQ2500 Colour Option £65
- Multifont Card for LQ550/850/1050 £95

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£95	RS232 + 8K Buffer	£75

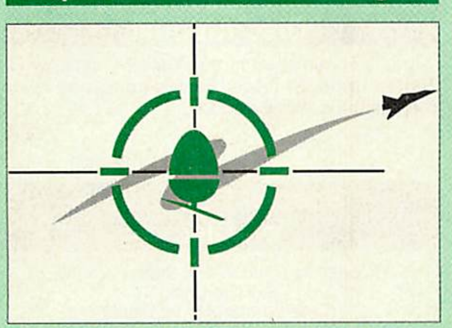
Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Special Offers this month

Canon BJ 10E Printer	£239
HP Deskjet 500 Printer	£349
Panasonic KX-P1124 Printer	£180
Philips CM8833-II Monitor	£172
TAXAN 795 Trinitron	£459
Wapping Editor + Mouse	£79

Take the Acorn Archimedes Test Flight and win yourself a Supersonic Concorde Flight



Take the new Archimedes 420/1 Learning system home by booking a slot in Watford's Acorn approved Test Schedule. Call in at our showroom and check it out for yourself – Leave a deposit and you may borrow one of our specially chosen Learning Curve System for up to 14 days. Be satisfied before you buy. Return the system in good order for a complete refund. At the same time you may enter our FREE aviator competition. You could win stunning prizes; Fly in First Class Luxury in Concorde; Learn to fly a helicopter' Take a weekend of flying lessons; and many more prizes. So why not take a test fly at Watford.

For Archimedes Mk II Hand Scanner, Real Time Digitiser, Graphics Tablet, Software & Books, see pages 5, 8, 10 & 12 of our advert.

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£16	£17	£3
3 to 1	£22	£24	£3
5 to 1	£36	£32	£4

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.
Centronics **£18;** Serial **£17**
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	–	£85

256k Multi Spooler

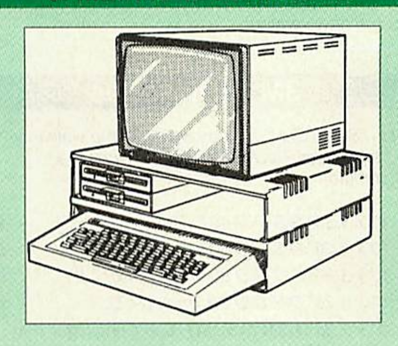
These Auto Centronics Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out **£135**
- 4 In/2 out **£169**
- 8 In/1 out **£199**

Compact Converter Units

Serial to Parallel **£36** Parallel to Serial **£37**

Plinths for the BBC B & Master 128K Micros

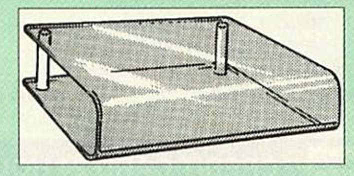


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £21
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £21
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75



CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	**£6.00**	–
BBC Micro	–	**£3.50**
BBC Master	–	**£4.00**
Archimedes Micro pair	–	**£9.00**
Citizen 120D	**£2.75**	**£4.50**
DMP2000	**£2.75**	**£4.75**
EX800/1000	**£3.50**	**£5.00**
RX/FX80/85/800/MX80	**£2.95**	–
FX/MX/RX100/1000	**£3.95**	–
Kaga/Taxan KP810/815	**£3.25**	**£5.00**
LQ400/500/550/800/850	**£3.25**	**£6.00**
LQ1050/LQ2500	**£4.00**	–
LX80/86/800/850	**£2.75**	**£4.50**
LX400	**£3.50**	**£5.00**
M1009/GLP	**£2.95**	**£3.75**
NEC P2200	**£4.50**	**£5.00**
Panasonic KX1080/81	**£3.25**	**£4.75**
Panasonic KX-P1124	**£7.50**	**£5.00**
SQ2500	**£23.00**	**£5.50**
Star LC10/NL10	**£2.75**	**£5.00**
Star LC24-10	**£2.95**	**£6.00**
Olivetti Ink Jet Cartridges (set of 4)	**£9**	

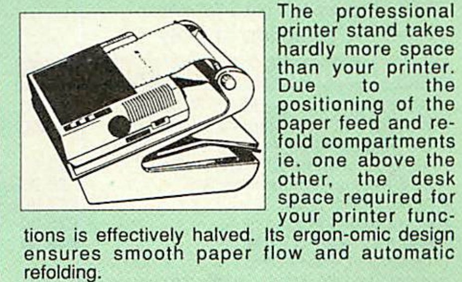
Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	**£8**
P115 for KX-P1180/P1624	**£8**
P145 for KX-P1124	**£8**
P140 for KX-P1540	**£10**
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	**£9.95 each**

Professional Printer Stand

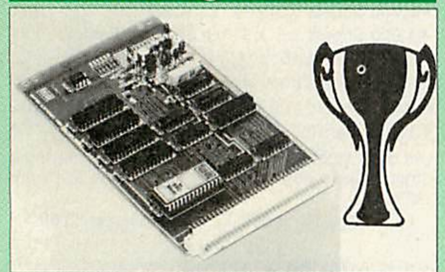


The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser



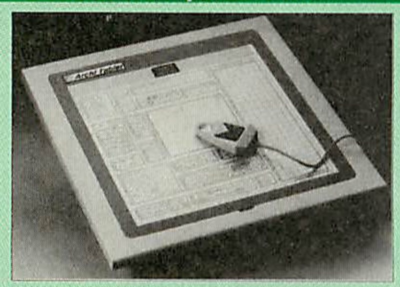
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic).

(FREE this month, PC Mouse Drivers & Art package)

(Now, fully LinCAD compatible. Recommended by Linear Graphic).

Special Price £225

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£29**

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	£16.00
• Watford DFS Kit complete	£69.00
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
• DFS Manual (comprehensive)	£6.95
• Acorn DNFS ROM	£17.00
• Acorn ADFS ROM only	£25.00
• Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

• SPECIAL PRICE	£44.00
• DDFS Manual	(No VAT) £6.95
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	£30.00

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• *10 x 5.25" S/S D/D 40T (744)*	*£5*
• *10 x 5.25" D/S D/D 40T (745)*	*£5*
• *10 x 5.25" S/S D/D 80 Track (746)*	*£7*
• *10 x 5.25" D/S D/D 80 Track (747)*	*£7*
• *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£11*
• *10 x 3.25" S/S D/D 40/80 Track*	*£7*
• *10 x 3.25" D/S D/D 40/80 Track*	*£8*
• *10 x 3.5" Double Sided High Density*	*£15*

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

• *10 x **M3** 3.5" D/S D/D 80 Track*	*£7*
• *10 x **M9** 3.5" D/S High Density*	*£14*
• *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
• *10 x **M5** 5.25" D/S D/D 40 Track*	*£5*
• *10 x **M7** 5.25" D/S D/D 80 Track*	*£7*
• *10 x **M8** 5.25" D/S H/D Hi-Density*	*£11*
• ***M2** 3" Double Sided*	*£2.50 each*



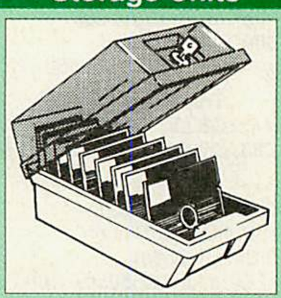
CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

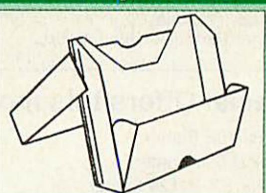


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

• **M35** – holds up to 50 5.25" discs	£4.95
• **M85** – holds up to 95 5.25" discs	£6.95
• **M25*** – holds up to 25 3.5" discs	£4.95
• **M50** – holds 50 3.5" discs	£6.50
• **M10** – holds 8 of No. 10 Data Cartridges	£15

* Not lockable

Plastic Library Cases



Holds up to 10 x 3.5" Discs.	£1.50
Holds up to 10 x 5.25" Discs.	£2.00

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)



BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D	£29 for 50		£52 for 100

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below. The tinting of the boxes indicates 40/80 track switchable disc drives. For ease of use, the switches are mounted on the front panel.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

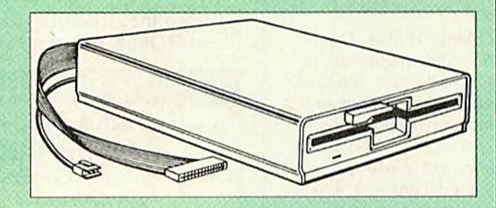
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

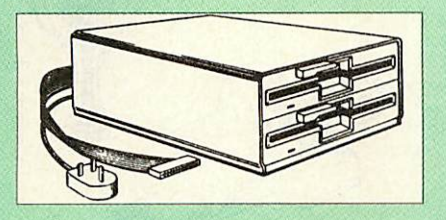
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415





"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS 400S £72		CS 400S £82	
800K (1,44M		CLD 800S £142		CD 800S £159
• TWIN Disc Drive Case, complete with Power Supply & Cables **£43** **Securicor carriage on Disc Drives £6 to £7**				

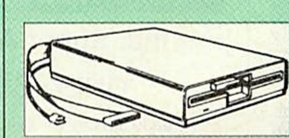
Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Special 40/80 Disc Drive/DDFS Mk II Offer



- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)



3.5" DISC DRIVE OFFER

These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Drives to connect to BBC Micros own PSU

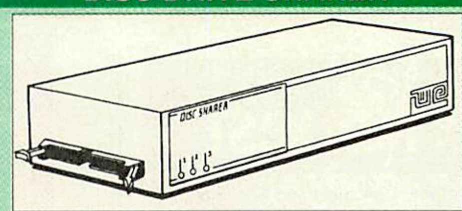
- **CLS35 400K Unit £62**
- **CLD35 Twin 800K £109**

Drives with built-in Power Supply Unit

- **CS35 Single 400K £84**
- **CD35 Twin 800K £126**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).

DISC DRIVE SHARER

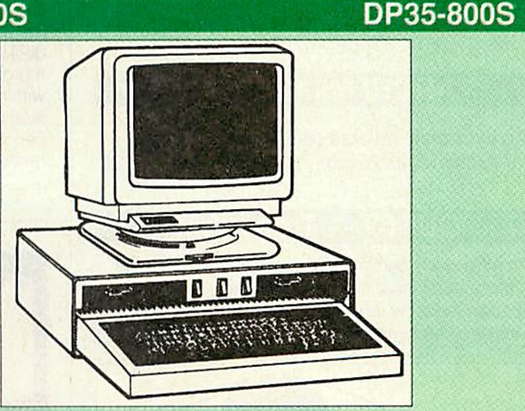


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables — Offer Price : **£55**

CDPM 800S — DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £165

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

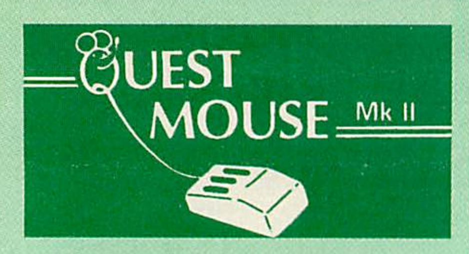
The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £154

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →



- Quest Mouse II & Quest Paint £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse II only £29
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18
  (P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software



Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

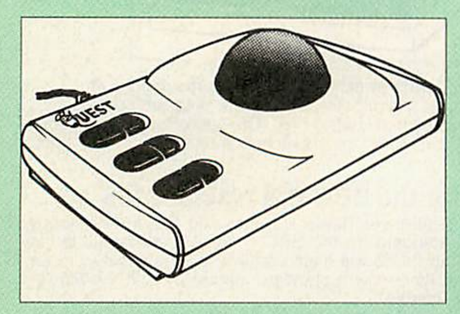
ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £32

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version **£27**
QT-20 Archimedes Version **£30**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible) £45
RB2 including Quest Paint £75
RB2-A for Archimedes £46

THE NEW Mk III AMX MOUSE

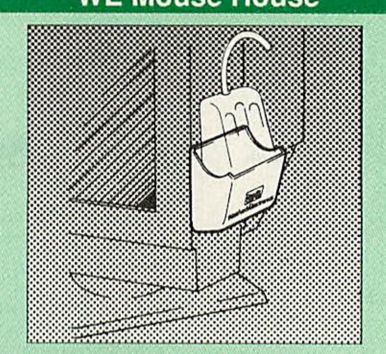
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

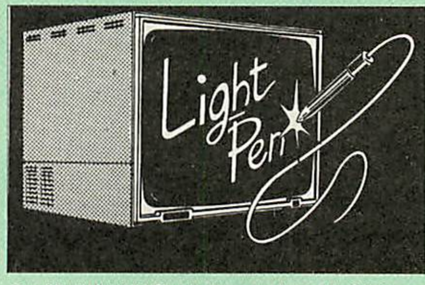
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



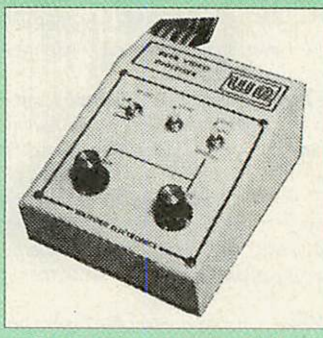
Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan

Hand-held Scanner for the BBC Micro

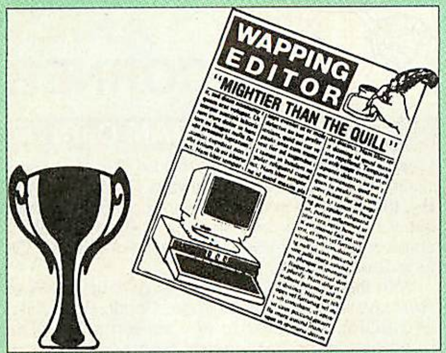


Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £135



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack £69
Wapping Editor plus Mouse £89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

NEW

At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

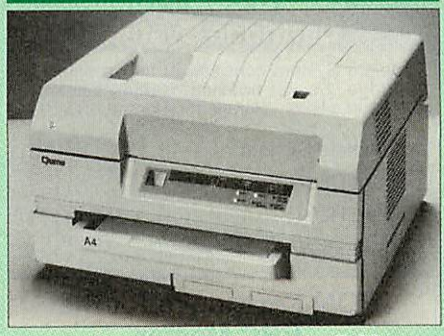
£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Laser Direct



By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £849

- Special High Res Laser Direct Card 600 DPI for Canon LPB4 Laser Printer £325
- LPB4 Printer plus High Res Card £1025

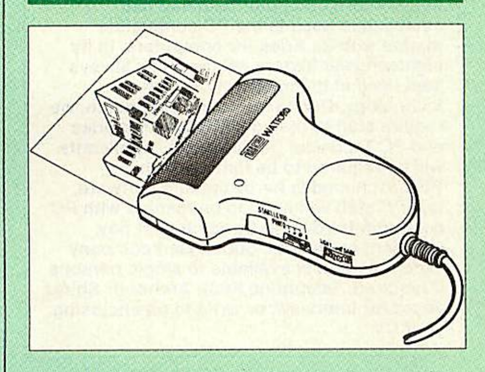
(For demonstration, call in at our retail shop)

VISA

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

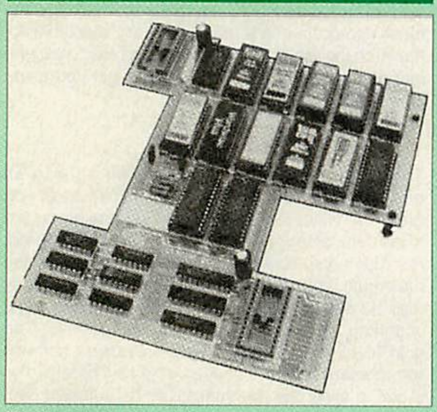
AHS-4 Archi 300/400 Version £149
AHS-3 Archi A3000 Version £175

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Shiraz Jessa for interview, or write to us enclosing your CV.

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

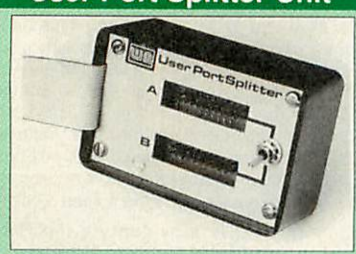
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

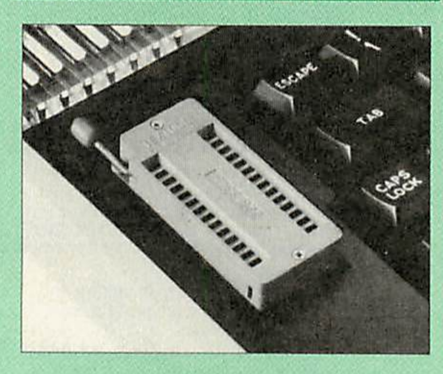
User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18** (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

• Complete System	£11
• Spare Cartridges	£2.75
• Spare Rack	£1.65

ROM Cartridges for the BBC Master

Will accept the new larger Plggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin £9; Quad £14

16K Disc Ram Module

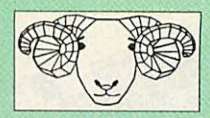
(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted £3



ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	£36
	Aries B-12C	£5

Aries B-488 IEEE-488 Interface Unit

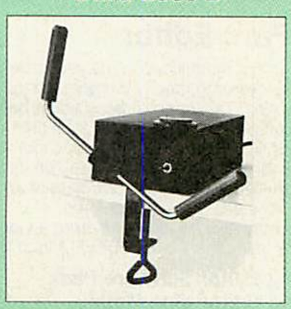
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

Voltmace Joysticks

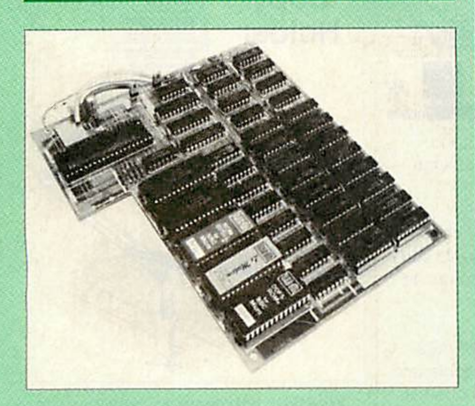
Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7
Delta-Cat A mouse eliminator Joystick for the Archimedes	£24

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 £25

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

- ROM/RAM card with 32k dynamic RAM **£48**
- ROM/RAM card with 64k dynamic RAM **£65**
- ROM/RAM card with a massive 128k dynamic RAM **£109**

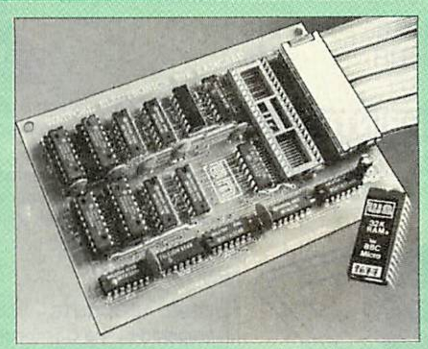
(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

16k plug-in Static RAM kit	£9
16k Dynamic RAM for Upgrade	£13
Battery backup	£3
Read and Write protect switches	£2 each
Complete ROM-RAM board All options installed	£115

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
Maths with a Story 2 (Disc). 4 further maths programs.	£11.25
Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
ECOLOGY O-Level program.	£20.00
POLYMERS O-Level program.	£20.00
Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule.	£20.00
ADVANCED TELETEXT SYSTEM	£8.65
PERIOD TABLE SOFTWARE	£20.00
Computers at Work – Primary	£17.35
Introducing Geography 11-17 years	£17.50
Electric Fields 6-14 years	£11.25
Espana Viva – 3 Discs	£19.95
WHITE KNIGHT Chess game	£16.00
A Vous La France	£29.00

More Educational Software

FUN SCHOOL 2 – Red: Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a Letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic.	£12.00
FUN SCHOOL 2 – Green: 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump	£12.25
FUN SCHOOL 2 – Blue: Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape.	£12.50
FUN SCHOOL 3 – Red	£19.95
FUN SCHOOL 3 – Green	£19.95
FUN SCHOOL 3 – Blue	£19.95
Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+	£26
More French Games – Another 6 games 12 years+	£26
Au Restaurant and Accident de Route 12 years+	£26
Boulogne and Oh-Les – 2 programs for beginners	£26
Letters to French Penpals – 11 years+	£26
French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16	£22
Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+	£22
More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+	£22
The Cloze Program – Using context clues to predict is much more than a gap filling exercise. All ages	£26
An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years	£26
Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years	£26
The Nuclear Reactor – An interactive, menu driven program for GCSE pupils. Demonstrates & explains nuclear fission & the chain reaction. 14-16 years	£22
PUNCMAN Learning punctuation	
Puncman 1 & 2 for 7 – 13 years	£15
Puncman 3 & 4 for 8 – 14 years	£15
Puncman 5 & 6 for 8 – 15 years	£15
Yes Chancellor – A chance to take over number 11 at Downing Street. 12 years+	£18
Letters & Pictures – Introduces phonic skills to Infants 6-8 years	£15
Numbers & Pictures – Early number learning is a great fun (4-6 years)	£15
Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults)	£15
Maps & landscapes No. 1 (9-14 years)	£18
Help Your Child learn Basic Map work No. 2 (9-14 years)	£18
Pirate – Educational Adventure (8-14 years)	£15
Spelling Week by Week (6-14 years)	£18

Archimedes Software

BUMPER DISC	£14	Jigsaw	£28
Bumper Disc 2	£14	Craftshop 1	£28
Bookbinder	£43	Desktop Stories	£27
Craftshop 2	£29	Droom	£17
DigiSim	£35	Numerator	£60

Gate Array Teaching System	£68
Fun School 2A Red (up to 6 years)	£14
Fun School 2A Green (6-8 years)	£14
Fun School 2A Blue	£14

Continued→ → → → → → → → →

Computer Concept's ROMS

Communicator	£49
Disc Doctor	£28
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42
TERMI	£25
Wordwise	£24

Wordwise plus

£40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
View Professional	£50
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell with 80 track disc	£25
Viewplot Disc	£20
(Please specify for Master 128 or Compact)	
View-Index	£12
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Hi-View	£38

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.00
DISC Version for the Compact	£18.00

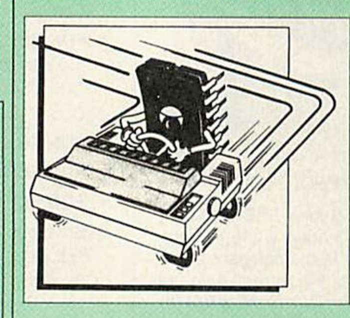
(When ordering please specify for which Micro & 40 or 80 track Disc)

All prices are exclusive of VAT

VIEW PRINTER DRIVER DISCS

Epson FX & RX 80	£10
Juki & Brother HR	£10

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

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EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



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- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features

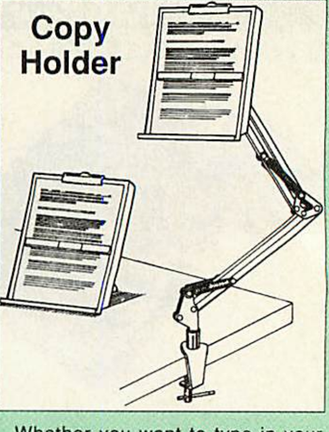
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Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

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Angle poise **£12** (carr. £3)

THE EPSON RX-FX-KAGA

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

ALL PRICES EXCLUDE VAT

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NEW

ACORN TO PC

Stop the Confusion!

Do you have to use both Acorn computers and PC's? Would you like to use your Archimedes or A3000 in PC-emulation mode but are unsure of the new commands?

Although Acorn machines (such as the BBC B, the Master, the Archimedes and the BBC A3000) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

'ACORN TO PC' also acts as a handy reference guide to all Acorn star commands and their MS-DOS equivalents. It also has an extensive and readable explanation of the directory tree and heirarchical filing systems in general. Both DFS and ADFS Acorn systems are covered.

'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £15.95

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.

Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc, and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work – even giving advice on writing and marketing your own programs.

A book you will enjoy to use as a reference, or read from cover to cover, over and over.

Only: **£14.95** (No VAT)

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed.

Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 3.0

(Now reads Archimedes Discs)

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives & read only ADFS and Watford DDFS – not DFS).

Price: £39

(Please write in for technical literature)

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

Continued→ → → → → →

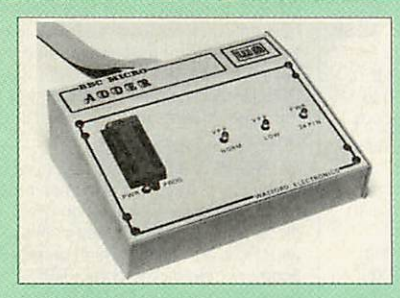
Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £18

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ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

£65 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£32**(carr £3)
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Ideal for cleaning and preventing static build-up on TV/Monitor Screens. **£2.50**

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Ideal for removing dust & dirt from Keyboard & similar inaccessible spaces. **£3**

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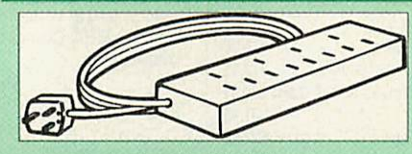
UHF Modulator	£4	16MHz Crystal	£2
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Speaker	£3	32.768MHz Xtal	£1
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Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. **£9.50**

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A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System **£13.50**

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This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

28pin DIL Header Plug

SOLDER type **£1.50** IDC CRIMP type **£1.95**

8 Way DIP Switch

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

Connecting Leads

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 3 pin DIN Plug + 1 Jack Plug	£2.50
to 7 pin DIN Plug	£3.00
to 3 Jack Plugs	£2.50
6 pin DIN to 6 pin DIN Plug (RGB)	£3.00

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	50p	75p
RS423 (5 pin Domino)	70p	80p
Cassette (7 pin DIN)	40p	95p
ECONET (5 pin DIN)	35p	50p
Paddles (15 pin 'D')	150p	250p
Disc Drive Plug 4 way	100p	–
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Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below). **£14**

Watford POWER DUCK £8

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DS88LS120	£5.25
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SAA5050	£8.75
UPD7002	£6.00
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27128A-250nS (12V5)	£3.00
27128-250nS (21V)	£4.50
27256-2	£3.50
27512-2	£4.95
27C101G (1 Meg)	£10.00
4013	75p
4020	£1.00
4164-15	£2.50
4464-12	£7.50
4464-15	£7.00
4816 RAM	£2.00
41256-15	£3.50
41256-12	£4.00
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65C12	£9.00
6512A	£10.00
6522	£4.00
6522A	£5.00
62256ALS-15	£10.00
62256P-12	£8.50
6818	£4.00
6845SP	£6.00
68B50	£2.95
68B54	£7.50
7438	50p
74LS00	25p
74LS04	25p
74LS10	25p
74LS123	£1.00
74LS163	£1.00
74LS244	£1.00
74LS245	£1.00
74ALS245	£2.75
74LS373	£1.00
74LS393	£1.00
75453	£1.00
75159	£3.00
9637	£2.00
ICL7673PA	£3.00

Assorted ROMS



ACORN ADFS	£25
ACORN BASIC 2 plus User Guide	£22
Acorn BCPL	£42
ACORN DNFS	£17
Acorn FORTH	£32
Acorn Graphics	£25
Acornsoft C Disc	£36
Acorn LISP	£19
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Acorn OS 1.2	£14
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Communicator	£49
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EPSON NLQ ROM	£25
Graphics Extension Rom	
GXR-B	£21
GXR-B+	£22
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MASTER OS ROM	£38
Master ULA (47)	£15
Master ULA (60)	£10
Micro Prolog	£25
Microtext Disc	£46
Nicrotext Rom	£199
NLQ DESIGNER	£25
Numerator – Archi	£69
Numerator – BBC	£39
Pendown ROM	£32
Rom Manager	£20
ROMIT	£29
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TED	£35
Termulator B, B+	£28
Termulator Master	£32
Video ULA	£14
ULTRACALC II	£26
1Mb OS ROM	£39

ARIES PC 386-SX



The Aries PC 386-SX combines many of the powerful features of the 386 system with the frugality of a price tag more at home on a 286 system. With 8/16MHz CPU, this system provides virtually full 386 performance, including the more convenient scheme of memory control that allows easy configuration of expansion RAM as EMS for DOS application.

Features:

- 80386-SX CPU with optional 80287/80387 Maths Co-Processor
- 8/16 MHz selectable speed
- Legal Bios with built-in Setup routine
- OS/2 and XENIX compatible

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Display:	Electro-luminescent (EL) backlit transflective supertwist LCD – 80 x 25 characters – 640 x 200 bit mapped IBM CGA compatible
Keyboard:	Full size Qwerty layout, Integrated Numeric Keypad
Power:	Internal NiCad battery – Battery Charge Indicator – Mains Adaptor provided supplies 9-15V DC External 12V DC
Standard Interfaces:	Parallel Printer Port – Twin RS232 Serial Ports – External Disc Drive Port – CGA Colour Monitor Port – External Keyboard or PS/2 Mouse Port
Accessories:	Internal Removable NiCad Battery Pack – AC Mains Adaptor/Charger
Dimensions:	300mm (W) x 220mm (D) x 61mm (H)
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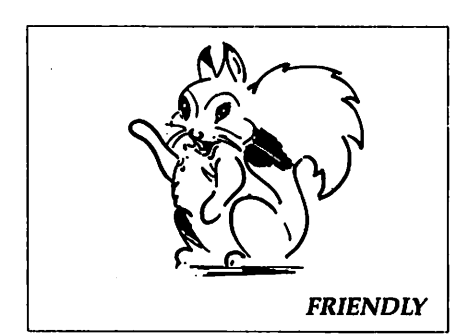
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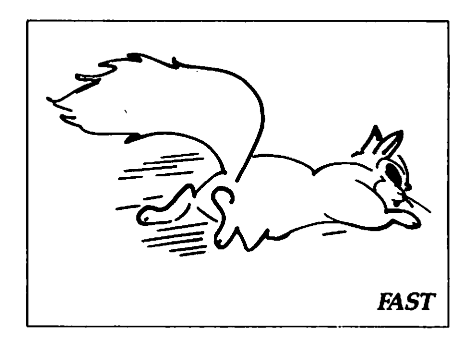
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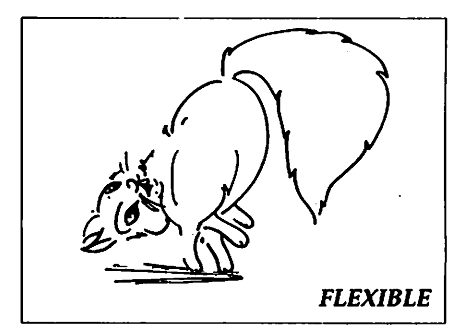




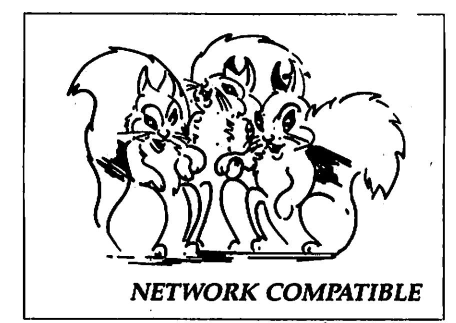
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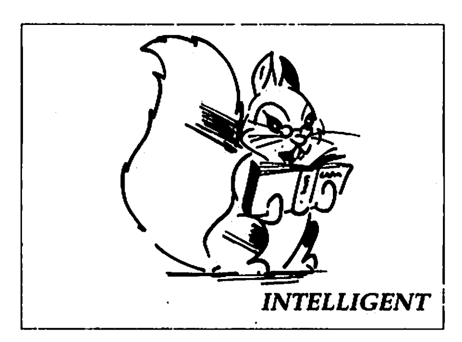
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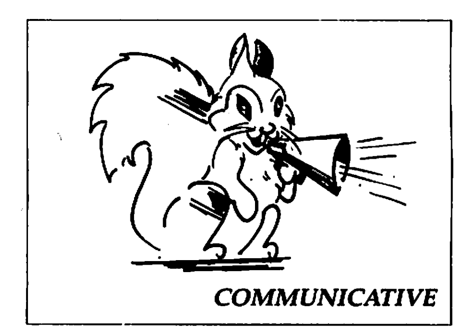
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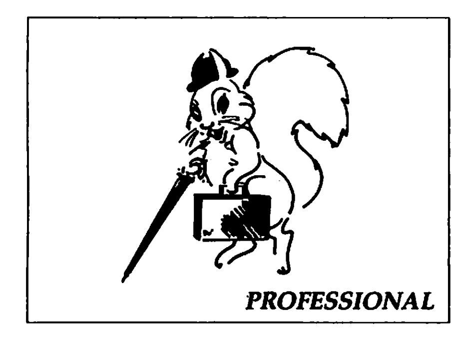
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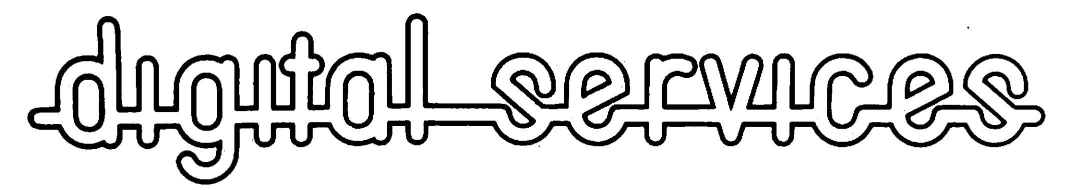


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EIGHT BITS

£10 TIPS ON INTERSHEET

Boz Perryman from Birmingham has sent a couple of tips about Computer Concepts' *Intersheet*.

The first tip concerns the slightly mysterious function SQS(list), which appears in the *HELP ISHEET list on screen but not in the manual.

What is strange is that *Intersheet* won't accept the SQS function in a calculation but will accept the VARI(list) function, which I discovered by examining the contents of the Sheet Rom, since this function is also not in the manual.

(Boz has version 1.06c of *Intersheet* but this may not be the case with, say, the Mega-Rom version). VARI must be a reference to variance, the statistical measure of dispersion of a set of values.

It doesn't actually calculate this, but instead calculates the sum of the squares of the values in the list – hence the SQS function. This function is very useful for statistics and data analysis, eg, calculating the correlation coefficient and gradient of a straight line fit to a set of data. Variance is defined as the mean squared deviation about the mean, so the larger this value then the wider the spread of the values about the mean.

The population variance (sigma^2) can be found by subtracting the square of the mean from the mean of the squares.

As an *Intersheet* formula this would be:

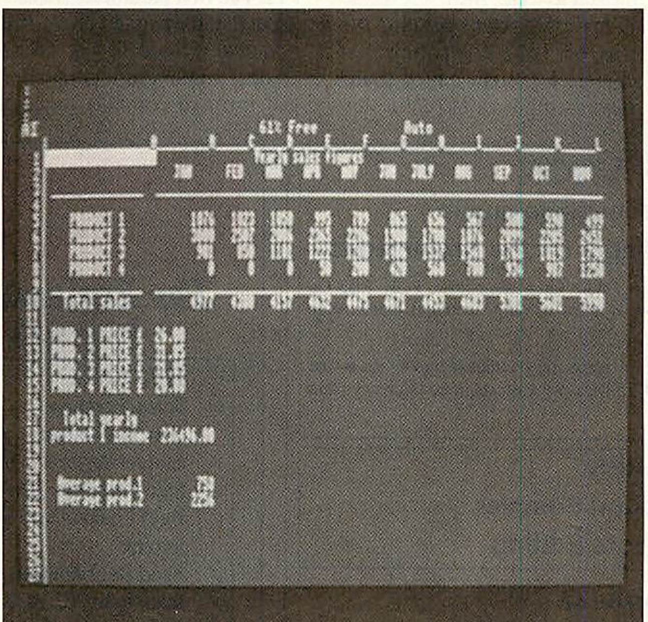
```
sigma^2 = VARI(list)/COUNT(list)-AVERAGE(list)^2
```

The sample variance (s^2) is:

```
s^2 = (VARI(list) - COUNT(list)*AVERAGE(list)^2) / (COUNT(list)-1)
```

The corresponding mean standard deviation (the other more common measure of dispersion) is simply the square root of the variance. The VARI function is useful for anyone using *Intersheet* for data analysis.

It saves a lot of space and calculation time, especially with large amounts of data, since it removes the need for the extra column to calculate the sum of the squares of the values in the list.



	A	B	C	D	E	Label	G	H
1	1234	4614	3634	5498	745r	2755	5435	
2	5987	8507	0924	9547	5872	4306	3634	
3	8936	8549	1626	3745	7575	4345	6279	
Label	5496	2703	6306	7095	1527	8906	5789	
5	7403	3955	2608	3693	7506	7022	7002	
6	3295	2944	7302	6812	7031	3745	7009	
7	5987	8507	0924	9547	5872	4306	3634	
8	8936	8549	1626	3745	7575	4345	6279	

It uses the same syntax as the other related functions and will sum over several lists.

The second tip is about the use of labels within *Intersheet* when used as a reference to a value. This is actually quite a powerful feature but only gets a brief mention in the manual.

If a column contains a label such as Price and a row contains a label such as Petrol then the value in the intersecting box of this column and row can be referred to as Price Petrol in a formula as opposed to the usual co-ordinates (eg, C25).

This is a way of overcoming one drawback that *Intersheet* has, namely that of always copying relatively.

Label references remain unchanged during copying but the normal box co-ordinates in a formula are altered in relation to the new position on the sheet.

The BOX() function can be used to refer to a box specifically, but this has the disadvantage that if the box to which it refers has to be moved, then the co-ordinates in the function (eg, BOX(C25)) are'nt changed, making all the formulae incorrect.

The best way is to use labels to refer to boxes absolutely and ordinary co-ordinates for relative references and to mix them within formulae.

Using labels in this way will also give more meaningful formulae, rather than a complicated list of co-ordinates.

There are certain things to remember when using formulae labels in *Intersheet* which are as follows (some are fairly obvious):

a) The labels must be present on the sheet otherwise a 'No such label' error is given when the formula is encountered.

b) The labels can be anywhere on the sheet and not just as column or row headings.

c) The row label can be to the right or left of the intersection box and the column label above or below.

d) *Intersheet* scans from top to bottom and right to left for the labels and will use only the first of duplicate labels.

e) Labels containing functions at the beginning of words are not allowed because *Intersheet* will translate these into the function and so cause a syntax error (eg, summary becomes SUMmary).

f) Similarly, normal cell references which are intended as part of labels are allowed, provided they are not placed at the front of the labels.

g) Individual labels can contain separate words (eg, Length of Cable) but a space is not needed between the two individual labels (eg, QuantitySockets

is the same as Quantity Sockets).

h) The operator characters +-*/^>< act on labels in the same way as ordinary cell references but are allowed as part of formulae labels provided they occur inside the label reference and not at the end.

i) The following characters are only allowed on their own (not as part of a longer label) when used as the row label, and cause an error if used as the column label:

```
! " # $ % & ' ( ) * + , - . /
0123456789:;<=>?@
```

A space is not allowed on its own as a column or a row label.

j) If a label such as min is placed before the label minute, then an error occurs if minute is used in a formula because *Intersheet* can find the label min but not the label ute. This is solved by placing the shorter label after the longer label on the sheet.

k) The resident integer variables A%-Z% can be accessed while using them as labels. This means that values can be passed to *Intersheet* from Basic, but it does not work in reverse. Labels do have their disadvantages also. Extensive use of labels uses up more memory and cell space (only 80 chars).

When used in a table which requires absolute references across and relative down, the down label references would require editing after a copy – you can't have it both ways!

£10 PARAMETER TO EXEC

Matthew Lewis from Chester-le-Street has written a program which allows parameters to be passed to EXEC files.

In the MS-Dos operating system on IBM compatible machines, a system called 'batch files', similar to EXEC files exists, where commands can be placed line by line in a text file, and this file can then be executed like a program.

The MS-Dos system has an advantage over the BBC operating system, which is that parameters may be passed to the batch file, so that you can vary what the file actually does!

The program, listed in the yellow pages, produces a machine code file called BATCH which is assembled at &900. This will EXEC a requested file but allows the passing of parameters.

After running the yellow pages listing to create BATCH, the program is run by typing:

```
*BATCH filename, Param0,
Param1, Param2
```

You can use up to 10 parameters. The first parameter (Param0) is passed to %0 in the EXEC file, Param1 to %1 and so on. To include a comma in a parameter, just use two commas together ie, ,,. To pass a blank parameter, put two commas with a space separating them, ie, , ,. To include a % in the EXEC file put %% instead.

To give you an idea of how this works, take for example the EXEC file:

```
*DIR %0
*%0
MODE 128
LOAD"%1"
```

If this file was created (using BUILD, or *!Edit*, *Wordwise*, or whatever) and saved under the name Start, and you are then issued the command:

```
*BATCH START,BASIC,DEMO
```

then the commands actually executed would be:

```
*DIR BASIC
*BASIC
MODE 128
LOAD"DEMO"
```

But if you issued:

```
*BATCH START,WORD,TEXT
```

then the same batch file Start

would execute as:

```
*DIR WORD
*WORD
MODE 128
LOAD"DEMO"
```

Parameters can be repeated as many times as necessary in the EXEC file. Should a parameter be used in the EXEC file which has not been defined after BATCH then a 'No such parameter' error is produced and all following parameters are ignored.

The program is split into four sections, identified by the labels batch, copy, setvars1 and doexec. copy is a simple routine which copies the rest of the command line after the *BATCH into memory at &C00 onwards.

Setvars1 goes through the command line at &C00 and replaces the commas with &0D except for those which are followed by another comma.

If they are, then the second comma is removed by shifting the rest of the line. While replacing the commas, the routine stores the address of the parameter in the two-byte array starting at vars. The next routine, doexec copies the filename on to the end of the EXEC string and ends it in &0D. readchr replaces the OSBGET routine.

It checks to see if the byte flag is zero. If it is then it calls the old BGET and if it isn't a %, then it passes back to the EXEC routine. If it is a %, it then reads the next byte.

If the following byte is also a % then it passes this back to the EXEC routine, otherwise it subtracts &30 (the Ascii code for the zero character) and if the result is negative it produces an error.

It then checks that the result is less than 10, doubles it and uses it as a pointer to get the appropriate parameter address from the vars array.

It then sets the flag byte to 1 and gets the first byte of the parameter, which it returns to EXEC.

It then checks the next byte to see if it is &0D. If so, then flag is decremented by one (making it 0). It keeps doing this until flag equals 0.

This routine also checks the carry flag each time BGET is called and if set it will reset the BGET vector to its old value. batch is the main routine. It calls copy, setvars1 and doexec and then sends EXEC filename to the CLI.

It does this before changing the BGET vector so that if a 'File not found' error occurs, the vector is not changed.

It then changes the BGET vector to point to the new routine. The program is not re-entrant, so you cannot call BATCH within a BATCH file.

It also uses pages &900, &A00, and &C00 which won't cause any problems, provided you don't intend to use defined characters, the serial port or Econet.

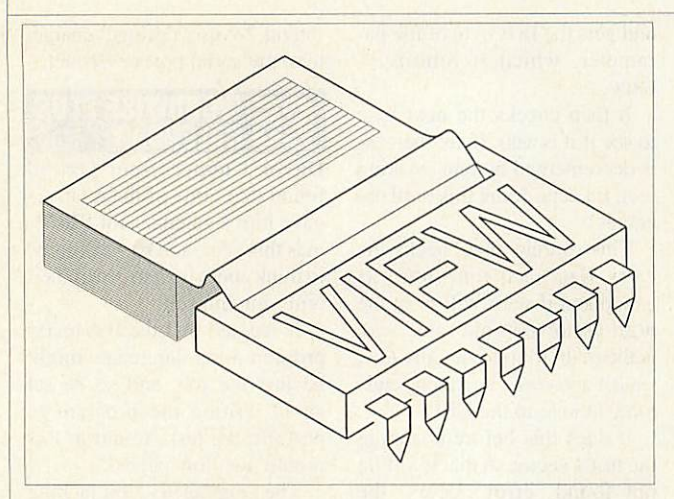
£5 WORDWISE PLUS CALENDAR

David Cooper from Oxford found that none of his relatives gave him a calendar for Christmas this year, and so was forced to think about how to repair their omission himself.

It seemed that the *Wordwise* programming language might be just the job, and so he set about writing the program to perform the task, found in this month's yellow pages.

The language is a bit lacking in several respects – no MID$ function in a text processing language, for instance, is imcomprehensible.

In the case of the calendar generator, CALEN, the lack of an array feature is a particular handicap, which makes it rather long-winded for keeping track



of days of the week and months.

The program can generate calendars from the beginning of any month to the end of that year. You can start each month on a new page, or separate them with a line of stars, and progress is shown on screen.

In use the program must be loaded into a segment. When run, it writes a *Wordwise* document, including embedded commands, into the main text area. It may then be printed out and/or saved to disc.

On a BBC Master, with PAGE set to &E00, there is plenty of room for the document in the main text area, provided that there is relatively little in any of the other segments. It should cope on a disc-based BBC B if PAGE is first lowered to &1100.

The program could be shortened using the abbreviated keywords described in *BAU* March 1989, but you may like to do that yourself.

Most of the program listing is fairly obvious, but a few explanations may be in order. L% is a variable which is set to 1 when the year is a leap year. Otherwise it is set to zero. S% is the day of the week (Sunday is 1) of the first day of the first month generated.

For simplicity in calculating these, only years after 1900 are allowed, but they may be entered in full, or as two digits, as 1900 is automatically added.

The program sets the printer to double width printing using Epson codes, (although of course these may be altered if your printer is not Epson-compatible), and heads each month's calendar with the month and the year. On David's printer, the Centronics GLP, the green and white codes come out as |B and |G respectively.

Of course it would have been much easier and quicker to write the program in ordinary Basic, which has already been done many times, but nevertheless, this is a good example.

£5 ENDLESS VIEW PRINTING

Here is a quick tip from **David Arnold** at Warleigh School, to print a *View* document endlessly, until you press ESCAPE.

This is useful for multiple copies of documents, but really comes into its own if you are just printing, for instance, a label, and wish to use *View* to set it up, program a function key

from the command screen as follows:

```
*KEY0 PRINT |M*FX138, 0, 128|M
```

If you want to repeatedly print a file, the command is

```
*KEY0 PRINT filename M*FX138, 0, 128|M
```

Note that if you're setting up label printing in *View*, and repeating a single label, you should either turn off the page feed mechanism, – ie, PB off – or use control codes to set the form feed length of the printer to the length of a label.

This technique of putting a command onto function key 0, and then adding the *FX138,0,128 command on the key as well will endlessly repeat almost any command in any package.

It works because the *FX command inserts the code for function key 0 into the keyboard buffer, repeatedly simulating pressing of the key.

£5 PRINTING ON THE CANON BJ-10e

Mr D Buckley from Harrow writes that he has recently bought a Canon BJ-10e Bubblejet printer to work with his Master 128 and *Interword*.

Immediately, he ran into the problem of printing a '`' sign, as it seems that the latest design of printers cannot be switched to different country/language fonts as could the older dot-matrix machines.

However, after about half an hour with the manual, and experimenting with *Interword*, the problem was solved. The '`' sign is character 156 on some of the character sets that this printer can produce (and all IBM-compatible printers).

By setting dip switch 5 to ON, the printer can be made to print characters in the code range 128-255. Two sets of extra characters are available depending on the setting of dip switch 9, which switches between two code pages.

The printer prints a '`' sign, and for that matter, any other character with a code of 128 or above, via the Embedded Command Menu (f1). This is particularly useful for printing accented letters and symbols.

By entering the decimal number of the character at its position within the text, the printer prints the correct letter.

However, there is also a snag with this method – the character within the text will also be printed! To ensure double letters – the accented letter and the text letter – aren't printed, a backspace code was added to the embedded command.

For example, say that an accented 'a' is required. Type 'a' in the text, and enter 131,8 in the embedded command menu. The printed result – à – looks slightly bold as the letter has been printed twice, but the end result is correct. Another way is to use the default pad character and embed the command over it in the same way.

This method produces a character which has only been printed once as the backspace code produces a space. For symbols which do not have a keyboard equivalent, this is the better method. The tip applies to the BJ-10e, and to any other IBM-compatible, as opposed to Epson-compatible printers.

Many printers today are IBM/Epson switchable, and you may want to leave the printer in IBM mode for other reasons. The problem is less severe in *Wordwise* where the command DP156 is all you need. Similarly, in *View*, the pound sign can be defined directly when the printer driver is defined.



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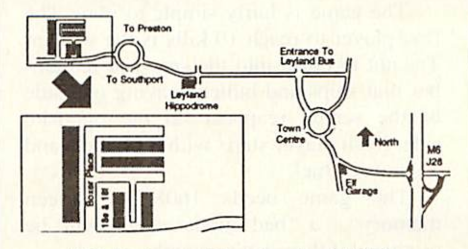
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DEATH BEFORE DISHONOUR

Whether you're lost in space, or just spaced out, you'll find you've got a battle on your hands with this exciting game for the Arc from **DAVID RADFORD**

After having a few drinks too many at a seedy bar on a mining asteroid somewhere in the belt between Mars and Jupiter, you accidentally slosh your beer over a giant from the Mars colony. Unfortunately, like everyone from Mars he has a very quick temper and treats it as a personal insult. He challenges you to a duel to the death in J-27 mining ships to satisfy his honour. Being more than slightly tipsy, you foolishly agree.

The game is fairly simple to play. The first player to reach 10 kills is the winner. Try not to crash into the sun, and remember that ships and bullets leaving one side of the screen reappear on the opposite side. Each player starts with 32 bullets and 32 units of fuel.

The game needs 160K of screen memory – a 'bad mode' error will be produced if there isn't enough.

I won't go into too much detail about how the program is put together – you'll learn more by working through it yourself. Instead, I'll concentrate on the ideas that went into it.

Due to the nature of the graphics used, it is quicker and easier to completely redraw the screen every frame. To stop flickering during the process I have made use of bank switching. This is a process involving two 'banks' of screen memory. One of these is displayed while the other is being redrawn, then the banks are swapped over, so that the hidden bank becomes displayed and the previously visible screen is hidden while it's being redrawn.



The first thing to be drawn in each frame is the background of stars. It's surprising how empty

Illustrations by Archer/Quinnell

the display looks without them. The effect is produced very simply by plotting 100 points on the screen at predetermined positions. The special effect at the beginning of a game where the stars zoom out of the centre of the screen is produced by altering the positions slightly for several frames.

Incidentally, all the graphics routines are custom written and don't use the VDU drivers at all. Instead they write directly to the screen memory. This is not good practice, but it was essential to get the game running smoothly. There are four of these routines embedded in the program: one to clear the screen and draw the headings, one to plot points, one to draw lines, and one to draw text in either normal or double size. Routines such as these are not recommended, but are generally alright as long as you always use OS_ReadVduVariables to find the start of screen memory.

This call uses two parameter blocks to pass information. The one pointed to by R0 on entry consists of a list of the VDU variables to be examined, followed by -1 to terminate. The two values we're interested in are 148 and 149, which are the start addresses of the banks of screen memory. The first value gives the address of the screen bank currently being accessed by the VDU drivers, and 149 returns the address of the bank being displayed.

The values are returned in a block pointed to by R1 on entry, and they are listed in the same order as they were in the variable list.

The program works in mode 12, so each bank is 80K long (&14000 bytes). The display consists of 256 lines, each using 320 bytes, and are arranged in memory from the top of the screen to the bottom. Each pixel requires four bits of information, so one byte contains information on two pixels, the left-most being held in the least significant nibble.

The formula for calculating the screen address of any point on the screen is: base + 320y + (x DIV 2), where 0<=x<640 and 0<=y<256. 'Base' refers to the screen start address, and y is measured from the top of the screen, not the bottom. This formula only gives you an address for a pair of pixels. If x is even, then the pixel you want is held in the bottom nibble, otherwise it's in the top four bits.

The graphics for the ships are very simple. Basically, the data for each ship consists of five points. These points are connected together by lines, which form the outline of the ship. The ship can be turned by rotating all the points around an imaginary centre. The formula for rotating a point is:

v=x*COS(-a)-y*SIN(-a)
w=x*SIN(-a)+y*COS(-a)

where 'a' is the angle by which to rotate the point, and v and w are the new co-ordinates. All the co-ordinates are relative to the centre of rotation.

To save on huge sine and cosine look-up tables, I have relied on three facts to shorten them: SIN(-a)=-SIN(a), COS(-a)=COS(a), and COS(a)=SIN(a+90). The first two remove the need for including negative angles, which would be needed for rotation (see above). The third rule means that you only need one table of 360+90 entries instead of two tables of 360 entries. This saves on memory and reduces table building time.

There is an entry in the table for each possible angle. Each entry is one word long. The word is actually the real value multiplied by 4096 and rounded down. This gives adequate precision for most purposes using sine and cosine. When you use the table for multiplication you have to remember to divide the result by 4096 to get the correct result.

One problem I had while writing this game was to do with this very table. The program uses the variables ang1 or ang2 to keep track of the direction the ship is facing. For every frame, a copy of the data for the ship is made and then rotated to this angle, before being drawn. The original program didn't use a copy, so turning right involved rotating the ship data by 10 degrees. This led to loss of accuracy and severe distortions.

Another important use of the sine and cosine table is with the movement routines. These routines use vectors, and sine and cosine can be used to calculate a vector for a given angle and magnitude using the following formulae:

x = r * SIN(a)
y = r * COS(a)

In this case 'r' is the magnitude and 'a' is the angle. (By the way, this can also be used to find a point on a circle of a given radius using the angle of the point from the centre. In this case, 'r' is the radius, and x and y are the co-ordinates of the point in relation to the centre of the circle.)

The magnitude of the vector controls the distance the object moves in every frame, and so directly controls its speed. However, each time the vector is changed (for instance, a ship thrusting in another direction) the old vector has to be taken into consideration, otherwise the ships would be capable of instantaneous changes in direction. In addition, some form of deceleration is also needed. The amended formulae look like this:

x = x - x/32 + r * SIN(a)
y = y - y/32 + r * COS(a)

The first parts cover the deceleration, where a small fraction of the old value is subtracted, reducing the magnitude of the vector by a small amount. On top of that is added the new vector, so that it eventually replaces the old one. This last procedure is also responsible for the acceleration process. The method probably doesn't entirely obey the laws of physics, but it's fast, simple and gives good results, so who cares! After all, this is supposed to be a game, not a serious simulation!





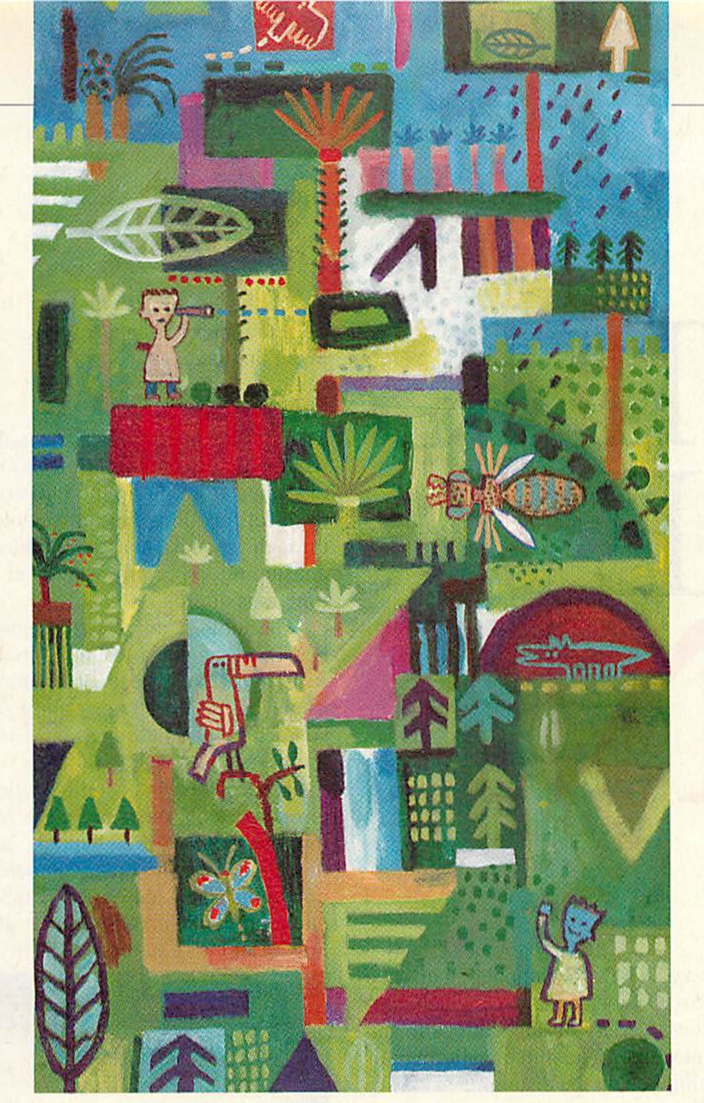
Duel for supremacy

The deceleration can be altered if you fancy a challenge. The variable airres% is set to five near the start of the program. The lower the value, the faster the deceleration. In fact, most of the variables defined at the start can be altered to give an easier or harder game. For instance, maxfuel% is the initial amount of fuel you start a game with, but bear in mind that it is actually the number of units multiplied by 16.

If you don't find the game hard enough, try altering maxshi% to five at the start of the program. This will give you five units of shield, each of which can absorb one bullet. This makes killing your opponent more difficult. Once your shields are reduced to zero, you're vulnerable – in fact you've had it!

	PLAYER 1	PLAYER 2
Rotate left	Z	COPY
Rotate right	X	PAGE DOWN
Thrust	F	KEYPAD /
Hyperspace	C	KEYPAD 7
Fire	G	KEYPAD *

The movement keys



BRANCHING OUT

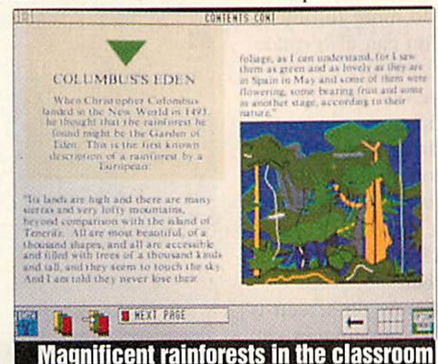
MAXINE MC COY treks down the charity that will soon bring rainforests to the classroom

Educational databases are becoming increasingly popular as teachers recognise their benefits. All kinds of material can be collected, organised, cross-referenced and presented in an attractive format.

Living Earth, an environmental charity which concentrates on education, previously highlighted the rainforests issue in a schools resource pack. Following its success, a database seemed the next logical step.

Project Director Niall Marriott sees the database as fulfilling three aims: firstly, to educate young people about rainforests and make learning fun; secondly, to provide cross-curricular support for the teaching of environmental issues; and finally, to keep pupils up-to-date with rainforest activity.

Living Earth is now aiming to recruit enthusiastic computer graphics artists to help illustrate the database. Their task will be to create the magnificence of tropical forests onscreen, to provide a graphical accompaniment to the facts.



Magnificent rainforests in the classroom

With only seven full-time staff, collection of the data to populate the database was an immense task. It was carried out almost singlehandedly by Rupert Booth, Chief Editorial Consultant to the project, who analysed books, newspapers and scientific journals for relevant information.

Although Living Earth has tried to make the database as attractive to children as possible, the addition of further graphics should make it an inviting package that is easy to get to grips with. The information is arranged under four main categories; ecology; importance and use of forests; people; and deforestation issues.

Each of these main headings has eight sub-headings, allowing access to related information in the form of text, maps, diagrams and illustrations. A 'walk through the forest' can be planned to follow a specific route.

Eventually Living Earth will produce two versions of the database, for eight-13 and 14-18 age groups.

Conscious of cost, Living Earth has tried to keep memory use to a minimum and the finished product will consist of one creator and three other discs. Information will be arranged in pages on the database, and it will be the task of the volunteer designers to create visually appealing graphics to complement the text.

The graphics created will incorporate digitised sound. There will be some sprite work and limited use of scanned photographs. Images will range from space-filling motifs to technical diagrams illustrating, for example, a cross-section of trees in the forest. Pages will depict not only trees, but also other plant, animal and bird life.

Pupils will be able to extract information and, via a page linker, create files and reports of their own. The creator disc will be interactive, allowing the addition of other information, as situations change, or for an inter-related project.

Fittingly, Acorn has donated two computers to the project, an A440 and an A3000, plus a small amount of money to bring the project up to Risc OS standard.

On completion, the database will operate under the windows environment, taking advantage of the multi-tasking features of the Archimedes. Versions will also be available for the BBC B/Master.

Although the price has not yet been finalised, Living Earth expects it to be around £35 - £45.

If you are interested in contributing your graphics expertise to the project, then Living Earth would like to hear from you. Practical knowledge of the Archimedes/A3000 is a must. Contact Niall Marriott, Living Earth, Upper Grosvenor Street, W1. Tel: 071-499 0858.

Limited funds mean that the charity is unable to offer payment, and is aiming to recruit volunteers on the basis of travel expenses and acknowledgment of their input. People able to provide their own machines, or even donate equipment (a colour printer) are also welcome.

Illustration by Spike Gerrell

DRAWING THE LINE



The A3000 starter pack

The A3000 is a powerful machine, but before you can harness that power, you need to understand the applications. Our series continues by looking at the applications discs

Illustrations by Simon Rees

Every A3000 is supplied with two Risc OS welcome discs which contain a variety of applications to run on the machine. The three major applications supplied on the discs are:

- *!Paint*, a painting program
- *!Edit*, a wordprocessor and text editor
- *!Draw*, an object orientated drawing application

Using !Draw

!Draw is an invaluable application which can be used for anything from creating disc labels to writing stylish letters.

It consists of a set of tools used for drawing images on screen, in the same way as you might draw onto sheets of transparent paper.

Each time you draw a shape, it is put on its own, onto a fresh sheet of paper. Because these sheets are transparent you can see all of the 'objects' building up in layers, making up a picture. Now imagine you want to move one or some of these 'objects'. You would grab, or 'select' the sheet(s) of paper containing the selected objects which can then be moved around. That is what an object orientated drawing package is about.

Of course, you can do more to objects than just move them. You can also rotate, magnify, reduce, colour, and so on.

Insert application disc one into the disc drive and bring up its directory viewer (by clicking on the floppy drive icon). Double click on the *!Draw* icon to load it into memory and then close the directory viewer, leaving a blank desktop. To activate the application, click once on the *!Draw* icon on the icon bar.

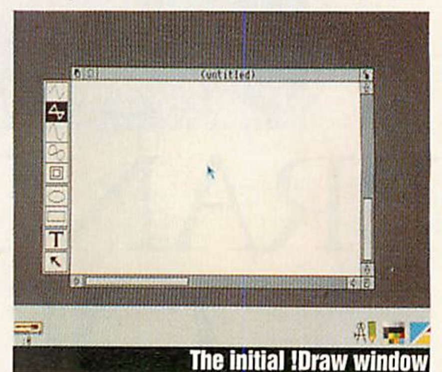
The *!Draw* window now on screen is basically the canvas that your images can be created upon. To see all of it you will need to reduce its apparent size – but more about that later.

Tool boxes

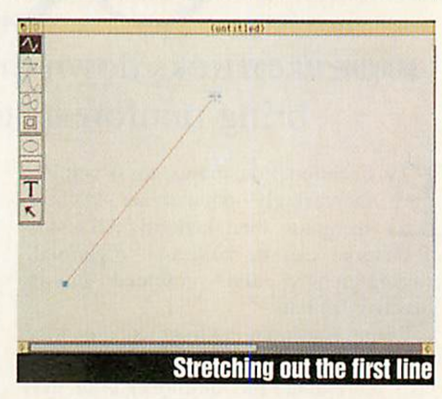
The panel on the left-hand side of the window is the toolbox. In Risc OS, menus (accessed from the Menu button) are used to select functions. But this involves going through several submenus, which is time consuming, especially when you use those functions often.

The toolbox combats this time wasting by providing the most used functions in icon form, so instead of clicking on the Menu button and trailing through various submenus, just one click on a tool in the toolbox will do.

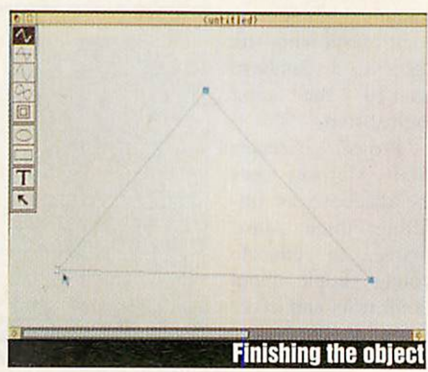
To see this in operation, click on the top (line) icon. Now press the Menu button over the *!Draw* window and move down and over the Enter submenu arrow – notice that the Line option is ticked. Now click on the Curve tool (the third icon down) and take another look at the Enter



The initial !Draw window

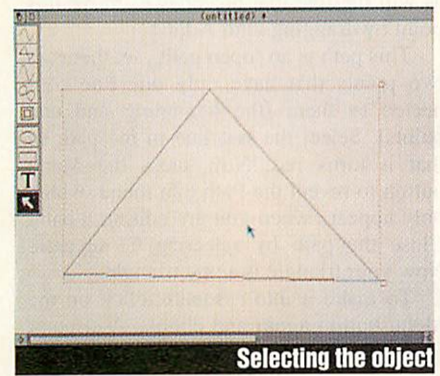


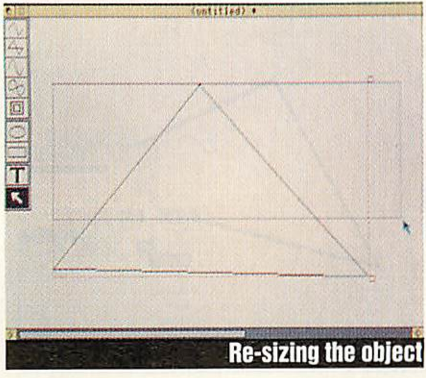
Stretching out the first line

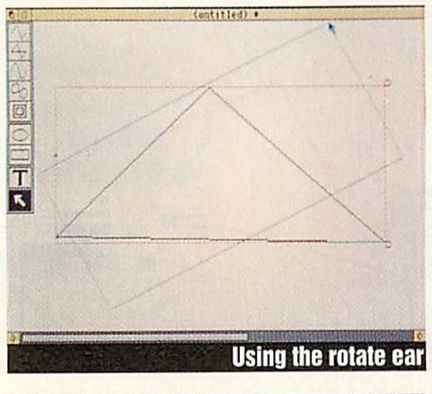


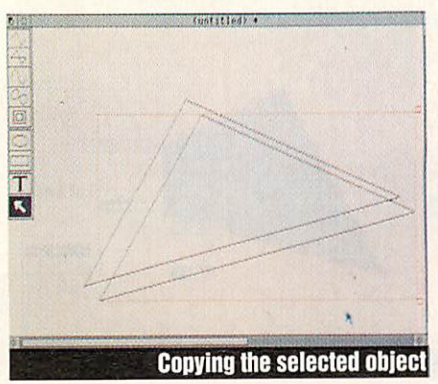
Finishing the object




Selecting the object


Re-sizing the object


Using the rotate ear


Copying the selected object

submenu – the Curve option is now ticked, emphasising the fact that this toolbox is a graphical form of part of the menu. You can even turn the toolbox on and off by clicking on the Toolbox option in the main (root) *!Draw* menu.

Click on the Toggle size icon (top right) to make the *!Draw* window occupy the whole screen. Notice that even now you can't see all of the page.

Drawing paths

Now you can start to experiment by drawing a shape – for example, a triangle. Click on the Straight line icon at the top of the toolbox (if it is not there, turn it back on by pressing the Menu button and clicking on the toolbox).

Move the pointer back over the main window – notice that it changes to a cross shape. Click Select once to tell *!Draw* where you wish to start your line, move the pointer and stretch the line out from this starting point. Move the pointer so the line is roughly diagonal and click Select again. This is the first line in a 'path'.

Move the pointer in another direction and press Select again, and to complete the triangle, move back over the start and press Select once more. Tell *!Draw* that you have finished your 'path' by clicking Adjust followed by Select.

You can now have some fun with the triangle. By choosing the Selection icon (the arrow at the bottom of the toolbox) you can pick objects by clicking on them with Select. Click over the triangle and it will be edged by a red 'bounding box'.

Holding Select inside this box allows you to drag it around, moving the transparent sheet the triangle is drawn upon. Releasing Select places the object at its new position.

The two small squares on the bounding box, called 'ears', allow you to rotate (upper ear) and re-size (lower ear) the shape. To re-size, hold down Select inside the lower ear and move the mouse. Releasing the Select button re-sizes the triangle to the new bounding box. The rotate ear operates in a similar way, allowing you to rotate the triangle.

The ear functions are also repeated within the *!Draw* menus – in the Select submenu. There they are titled Rotate, X-Scale and Y-Scale. However, using the ears is much easier.

Ensure that the triangle is selected and then go onto the Select submenu and choose Copy. The selected object is copied, so now you have two triangles. Try selecting both of these: use Select for the first and Adjust for the second (it is important to remember that the Adjust button is used to select multiple objects).

Notice that, when you have both triangles selected, any operation on one is duplicated on the other. This is always the case, even when you have 20 items selected. Double clicking will also select the object underneath the object you are clicking on, and more double clicks move you further down the transparent sheets.

Now, delete just one of the triangles by selecting it and choosing Delete from the Select menu.

Styles

Objects can also have styles, chosen from the Style menu. Select your triangle and then move to the Style submenu.

Go onto the Line width submenu and click on Four. You have just told *!Draw* to draw a triangle with lines that are four units wide. Try this with other units (using Adjust on the menu so that it doesn't

close). At the very bottom is an 'editable field' where you can type in custom widths not shown on the menu.

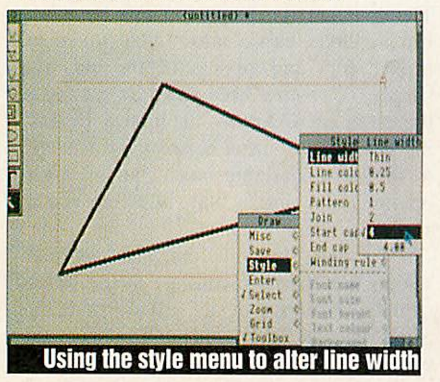
You can also alter the colour that the lines are drawn in. Move over the Line colour submenu in the Style menu. You will see a box of colours and three sliders – you can choose a colour from the box by clicking on it and then clicking OK.

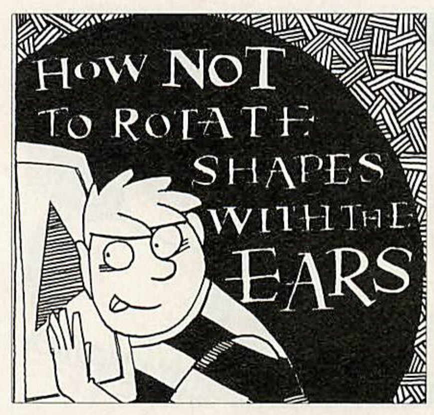
Alternatively, you can use the sliders, which you will recognise from the palette application, to mix your own colours.

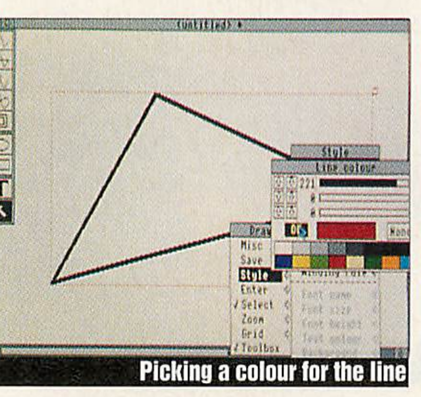
Your new colour will be number 17, there are only 16 colours in mode 12, so using the sliders is only really effective in 256 colour modes, like mode 15.

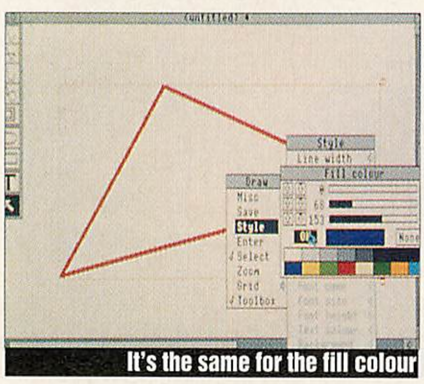
You can also fill the triangle with a colour using the Fill colour dialogue box. At the moment it is None, so the triangle is transparent. However, by clicking on a colour and then OK you can change this in the same way as you did the line colour.

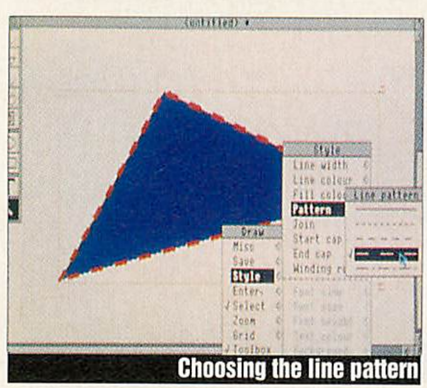
Line pattern allows you to choose whether the line is solid or dashed.

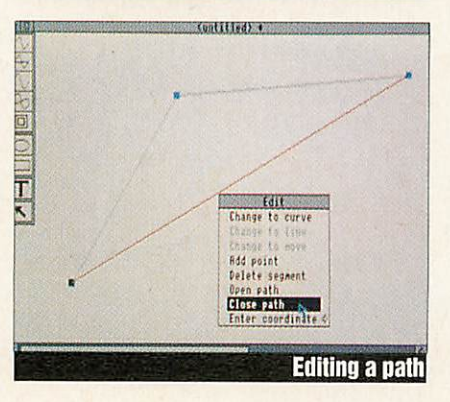

Using the style menu to alter line width




Picking a colour for the line


It's the same for the fill colour


Choosing the line pattern



Editing a path

Editing paths

To alter your path, select the triangle, then choose Edit from the Select menu, (this can also be done by clicking on the top tool icon and clicking Adjust over the object). *!Draw* then shows the triangle with 'grab handles'. If you press Adjust over one of these handles, it will turn red, as will the line that precedes it. Move this point by dragging with Adjust.

This path is an 'open path', ie, there are two points that have only one line connected to them (the beginning and end points). Select the last line in the path so that it turns red. Now press the Menu button to reveal the Path edit menu, which only appears when you are editing a path. Close the path by selecting Close path. Now your triangle is a real triangle.

To make it into a square, click on the Menu button again and choose Add point – this places a new grab handle half way along the red line which can also be moved around by dragging with Adjust.

You should always use closed paths when drawing shapes. The second icon down automatically closes paths when you have finished drawing – select it and then draw two lines and press Adjust. Notice that you need not draw a third line – *!Draw* does this for you and joins up the first and last points.

Curves

Now let's move onto curves. Delete both triangles by choosing Select all, then Delete from the select menu. (It's much quicker to choose Select all with the Adjust button and then Delete with the Select button).

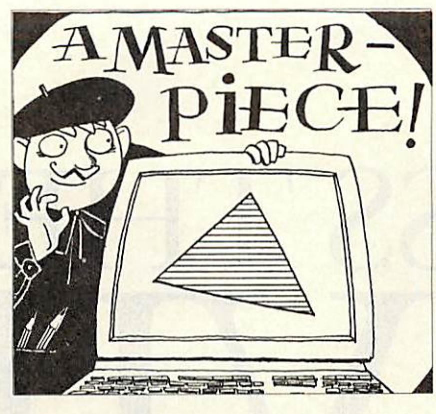
!Draw deals with Bezier curves. A Bezier curve has a start, an end and two control points. To draw such a curve, click on the third icon down and draw just one line, ie, press Select, drag the line, press Select again, then press Adjust.

This new line has four grab handles: two blue ones, which have the same function as before and two yellow ones which alter the curve. It's best to learn how these handles work yourself. You can do this by playing with them to discover how they affect the shape of the curve. There are some complicated mathematics involved.

Curves have the same properties as lines, and can be put into paths, given styles, etc. You can even mix the two in a path by clicking on the relevant icons as you draw.

The fourth icon down is the Curve auto close icon (the same as the second icon down but with curves) and the fifth icon down is the Move icon.

To see the effect of the Move icon, first draw a line (without pressing Adjust afterwards – you want to carry on this path!),



select the Move icon, place the move point somewhere and then select the curve icon and draw a curve, pressing Adjust to finish your path. This path is one object (try selecting it) but it has a move in it, just like a line that you can't see.

Other functions

Those are the basic principles of *!Draw* – now for the less obvious functions.

Under the Misc submenu is New view, which brings up another view of your picture. Select it and draw a line to really prove that *!Draw* really can do two things at once! You can have up to eight new views at a time, although more than three isn't really useful.

Paper limits allows you to choose the size and orientation of the paper you are drawing onto. Sizes range from A5 through A4 (the size of this page) to A0. A4 is the best option (unless you have a wide carriage printer).

When you have the Show option ticked with a printer driver installed, *!Draw* will place grey borders on the page so that you will know if the complete drawing will be printed out and not cropped to your printer's page size. The grey is the area near the edge of the paper where the printer cannot reach.

A printer driver is an application that controls your printer. It can take a file from any program and print it in the correct way, clever eh?

There are three types supplied.

- *!PrinterDM* for dot-matrix printer
- *!PrinterPS* for Postscript laser printers
- *!PrinterIX* for an Integrex Colourjet

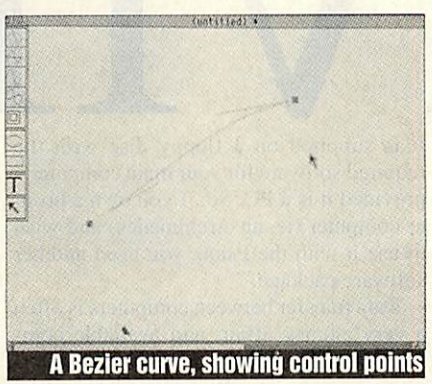
Load the driver for your printer by double clicking on its icon. It will now sit, waiting, on the left-hand side of the icon bar (it's on the left because it represents a physical device, a peripheral).

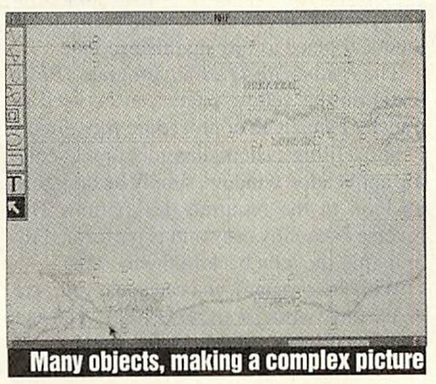
Press Select over the icon and a dialogue box will appear. If you click on the printer box (at the top), you can choose your printer type and the resolution that you wish it to print at. Clicking Menu over the icon and choosing Save choices stores your configuration on disc so you needn't repeat this every time.

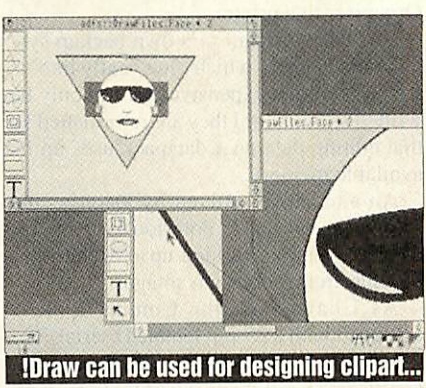
Now when you choose to print, and your printer is ready, you can obtain a hard copy of your picture.

There'll be more on printer drivers in a later issue. For now, it's back to *!Draw*.

The Save submenu allows you to save your picture permanently. First of all open a directory viewer on a blank disc. Now draw a picture and then move over the Save and then File submenus. Press CTRL-U to delete the standard filename and type in the name of your drawing, eg, MyPic. Then drag the drawfile icon above the filename onto the directory viewer. If you can't see the directory viewer, rearrange the windows before saving, perhaps sending the *!Draw* window to the back.

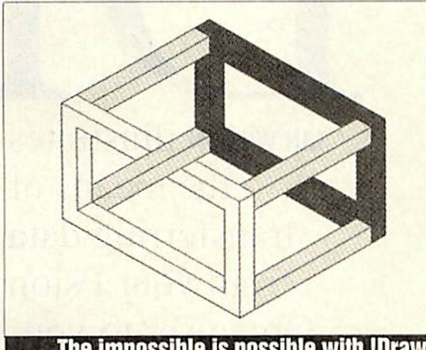

A Bezier curve, showing control points


Many objects, making a complex picture


!Draw can be used for designing clipart...



...and admiring it


The impossible is possible with !Draw

To reload your drawfile later, either double click on it or drag it onto the *!Draw* icon on the icon bar.

The Style menu I have explained in enough detail for the moment. This leaves the Zoom and the Grid submenus.

The Zoom menu allows you to change the apparent size of your picture. It is in ratio form, so if you make it 2:1 your picture will appear twice as big – useful for fine adjustments. At 1:2 it will be half size, so you can see more of the paper at one time. Used in conjunction with the New view option you can zoom the second view down very small so that you can see your picture building up without having to zoom up and down in the main window.

The Grid option allows you to place a grid over the paper. You can lock to this, ie, when you move the pointer it will only visit the points of the grid and not in between them.

To set up the grid go over onto the Grid submenu and click on Show and then Lock. Use the Adjust button for Show and Select for lock.

The grid can also be of any dimensions and have any number of subdivsions. For instance, to make it metric, just click on the Cm option. The Cm or Inch submenu allows you to alter the space between grid dots and the number of subdivisions between them.

Next month the series continues with a look at sprites, which are created with !Paint. *If you have any questions, send them to the usual address. Mark your envelope 'First Steps'. We will publish them, with answers, in a later issue.*

ACROSS THE DIVIDE

IAN WILSON illustrates the means of transferring data from your Psion Organiser to your Archimedes

The Psion Organiser is often seen as just a rather flashy Filofax. In fact, it is a very powerful computer, the equal of any eight-bit machine.

The advantages of its pocket size are obvious, but certain disadvantages become apparent as you start using it. Worst of all is the strange shape your jacket becomes when you try to carry a keyboard, disc drive and colour monitor in your top pocket. A solution to this problem is to do editing and backing-up on your Archimedes, and leave that at home.

The next step, then, is to join up the two machines. The Psion Comms Link is a device which plugs into the top of the Psion Organiser, has a serial cable terminating in a 25-pin female D connector (more about that later) attached to it and has software on Rom for data transfer at the Organiser end.

```
!Boot
| !Boot file for PSION | BBC
Acorn User 1991 IconSprites
<Obey$Dir>.!Sprites Set
File$Type_6a5 TABfile Set
File$Type_6a4 PSIONfile
!Run
| !Run file for PSION  | BBC
Acorn User 1991 IconSprites
<Obey$Dir>.!Sprites Set
File$Type_6a5 TABfile- Set
File$Type_6a4 PSIONfile Set
PSION$Dir <Obey$Dir>
WimpSlot -min 36K -max 36K
Run <PSION$Dir>.!RunImage
Menu
^Psion menblk% Import} !saver%
Info !info% Quit \fin ~
```

The Script files !Boot, !Run and !Menu

It is supplied on a floppy disc with the required software for your main computer – provided it is a PC. So, if you own a proper computer (ie, an Archimedes) and wish to use it with the Psion, you need another software package.

Data transfer between computers is often a very clumsy affair, and available commercial software for Arc to Psion transfer is no exception. The Risc OS desktop is a very friendly user interface and seems to be the ideal place to tidy up this process.

The *Psion File Transfer* program (*PFT*) listed on the yellow pages can be used to transfer Psion data or procedure files directly into a filing system directory or text editing application window, simply by dragging its icon to the required destination. The reverse is equally easy and is performed by dragging the icon back to the icon bar.

With this program, you can make your Arc do the dirty work for the Organiser. You can write datafiles or procedures in a suitable text editor or wordprocessor or send text from the Organiser to a printer.

The Psion Organiser's own backup system uses Eproms which plug neatly into its back. These are expensive and can only be written to once until they are reformatted so that editing data on a datapack uses up its available memory.

An alternative, offered by Psion, is the Rampack, but this is notoriously temperamental. Therefore backing-up to Archimedes disc has tremendous advantages.

As I have said, the Comms Link is equipped with a 25-pin female D serial connector. The Archimedes serial port is nine-pin male. Therefore an adaptor is required. Unfortunately 'off the peg' adaptors do not work, so you need to dust off that soldering iron. The connections are as in figure 1.

If you are using an A3000 you must have a serial upgrade. It is important to plug everything in before switching anything on, especially if a Rampack is anywhere near your Organiser! If you haven't got the *BAU* monthly disc, start typing in the program.

First create an application directory named !Psion and into this directory save the six files needed for the program. !Boot and !Run are obey files written using *!Edit*. The Menu file is also written in *!Edit*, this time as a plain text file. The files Templates and !Sprites were originally created in *!FormEd* and *!Paint* respectively.

Type in and run the programs *MakeSpr* and *MakeTpl* and save the files produced in the !Psion directory. Finally, type in and save the program *!RunImage* in the application directory.

Before starting to transfer files, it is necessary to set up the communications parameters for both computers. I find that the program works best at a baud rate of 4800, but both computers are capable of 9600 and if your soldering is better than mine, you may get good results at the faster rate.

Set up the Psion as in table 1, the Comms Link manual will tell you how to do this. On the Arc, enter the command line and type *CONFIGURE baud 6 [RETURN] and *CONFIGURE data 5 [RETURN] and then a CTRL-BREAK. Now everything is ready.

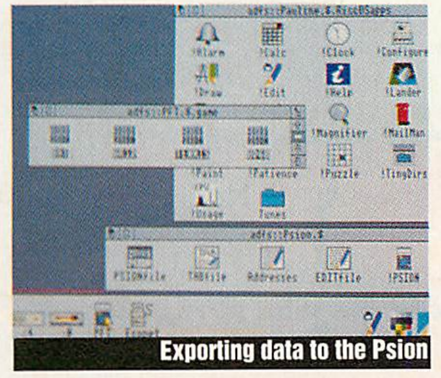
If you are familiar with the Risc OS desktop, you will have no trouble using *PFT*. To load the program, double click on the !Psion icon in its directory window and the icon will install itself on the left-hand side of the icon bar. Clicking on Menu over the icon discloses a small menu whose first option, Import, leads to a dialogue box.

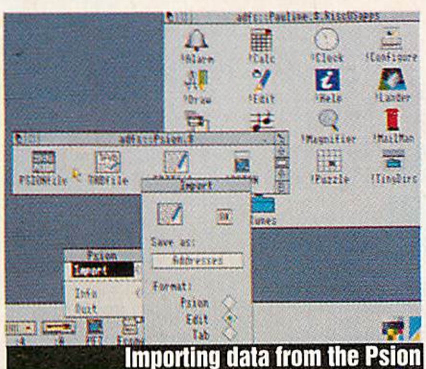
From here you can drag the Psion file icon to a directory, an application window or a printer driver icon and then send the file from the Psion Organiser. Three different file formats are possible and are selected by clicking the appropriate radio button.

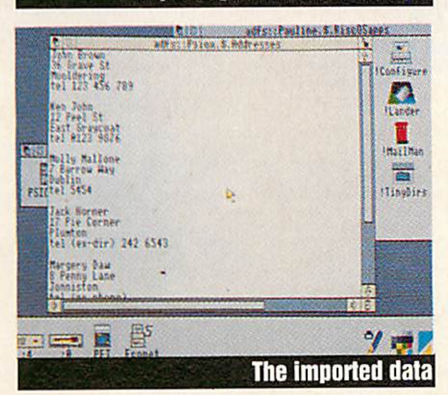
Psion format is, as you would expect, a pure copy of the Ascii codes sent by the Psion. Edit format removes all control codes except for linefeed and the file is organised so that a new line separates each field, and two lines separate each record. This is the most convenient way of using *!Edit* to edit the file. TAB format is similar but TAB characters now separate the fields, and a new line denotes a new record.

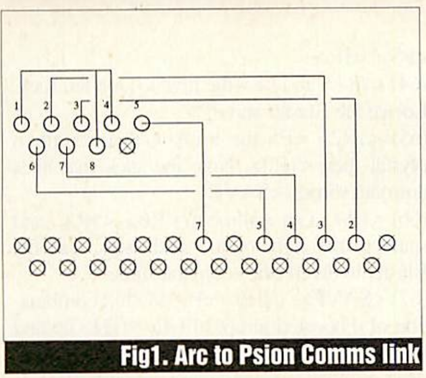
This is probably the most useful format as it can be imported to, say, *Pipedream* which then sorts each field into columns. Organiser Programming Language (OPL) procedures are not significantly altered, as they do not contain control codes except CHR$(&1A at the end of the file.

Transferring the files back to the Organiser


Exporting data to the Psion


Importing data from the Psion


The imported data


Fig1. Arc to Psion Comms link

is a piece of cake. Set the Organiser to receive and then drag the icon of the file you wish to transfer to the *PFT* icon on the icon bar. It may originate from a directory or an application. *PFT* is quite intelligent here and examines the outgoing file for features of an OPL procedure and for the presence or absence of TAB characters. It then makes the necessary adjustments to the file as it is sent to the serial port.

This program is based on the *BAU* Risc OS *Skeleton* published in the March 1990 issue of *BBC Acorn User*. The *Skeleton* program does not include proper Risc OS save and load routines and so these had to be designed. Message passing between applications is an essential feature of Risc OS multi-tasking and is not quite as complicated as it first appears. At the end of a dragging operation, the destination tasks handle is determined by "Wimp_GetPointerInfo" and a message sent to that task using "Wimp_SendMessage". The reply to this message contains the proposed pathname to save the file and is received in the Wimp Poll.

Once the file is saved, your task sends another message to the same destination, informing the other task that the file is saved. The importance of this second message is that if the destination task is not the filer, it may load the so called scrap file and then delete it. The external task, for completeness, must then inform your task that it has done so.

The programmer's reference manual explains in detail the parameters passed to "Wimp_SendMessage". The scrap file rejoices in the system variable name "wimp$scrap" which is set by the *!System* application and is located in the !System directory.

Another method of transferring data between applications is copying blocks of Ram from one task to another. This is obviously much faster than using a scrap file, but cannot be used by *PFT* because a file coming from the serial port is of uncertain size.

Reading data from the serial port is made easy by using the system device serial: which can be opened for input like any other file. So, *PFT* reads the serial port, byte by byte, and after calling FNfilter it writes to the destination file.

The effect of FNfilter depends on which format is selected by the user. Writing to the serial port is equally easy.

BAUD	4800
PARITY	NONE
BITS	8
STOP	1
HAND	RTS
PROTOCOL	NONE
ECHO	HOST
WIDTH	NONE
TIMEOUT	NONE
REOL	<LF>
REOF	<SUB>
RTRN	NONE
TEOL	<LF>
TEOF	<SUB>
TTRN	NON

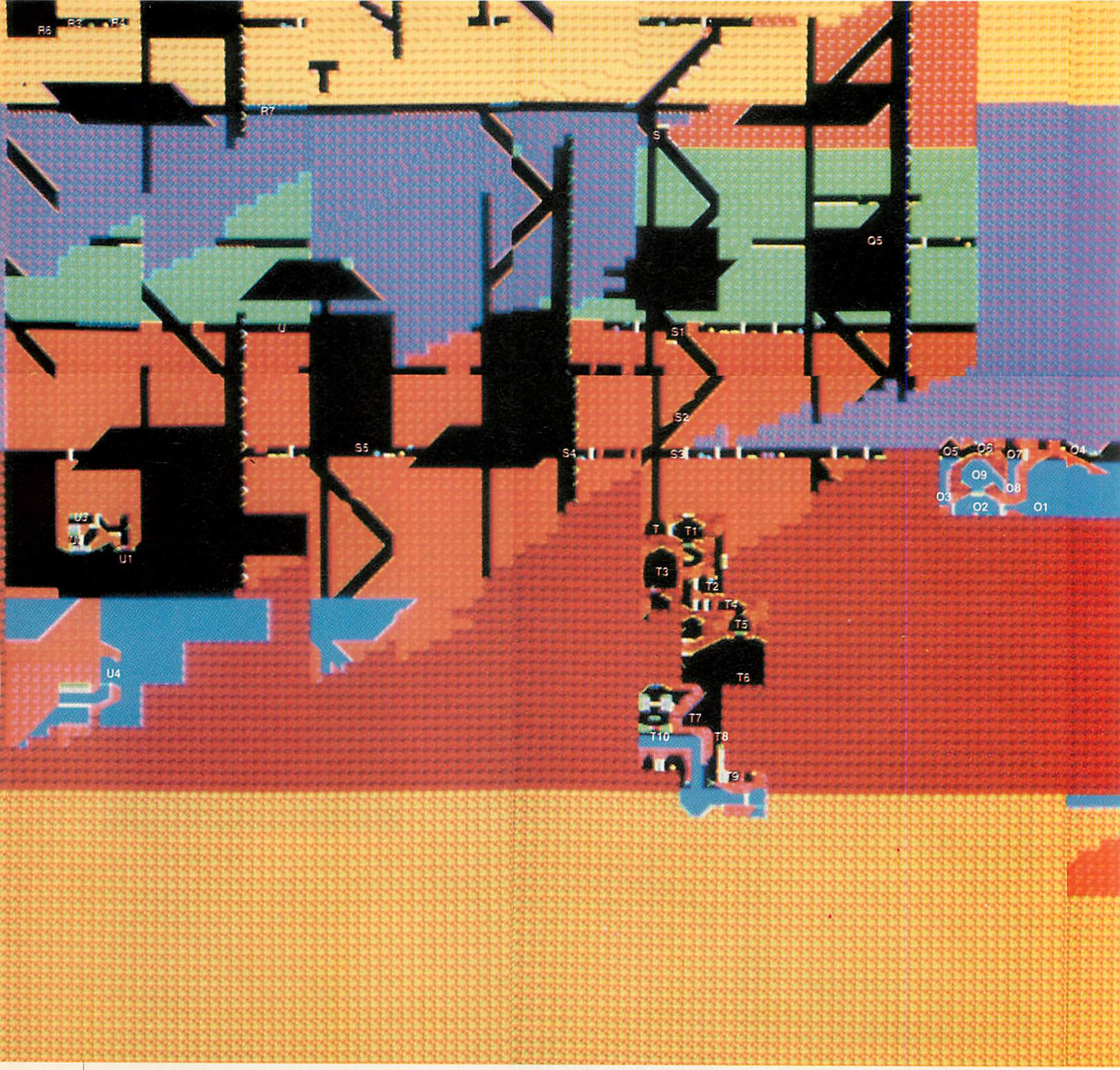
Table 1. Psion setup values

The difficult bit is 'unfiltering' the data as it must be automatically translated to Psion format whatever format it begins as. FNfilter looks for a colon in the first line of the file and if a colon is present, the file is assumed to be an OPL procedure. FNget_type detects the presence of TAB characters in the file. The outcome of these two functions determines the effect of FNunfilter which is called for each byte as it is sent to the serial port.

Finally, a few words about *Organiser Tennis*. Remember the good old days before *Space Invaders*, when the first silicon chips hit the arcades? That was the time to finish batting a ball against the garage door, come in from the cold and play the game in front of the living room fire.

For those of you who didn't believe that the Psion Organiser was capable of animated screen displays, here is a nostalgic little utility which brings computer Tennis to wherever you go. Ideal for whiling away those odd moments in your accountant's waiting room. Or even his office. You can do it anywhere!

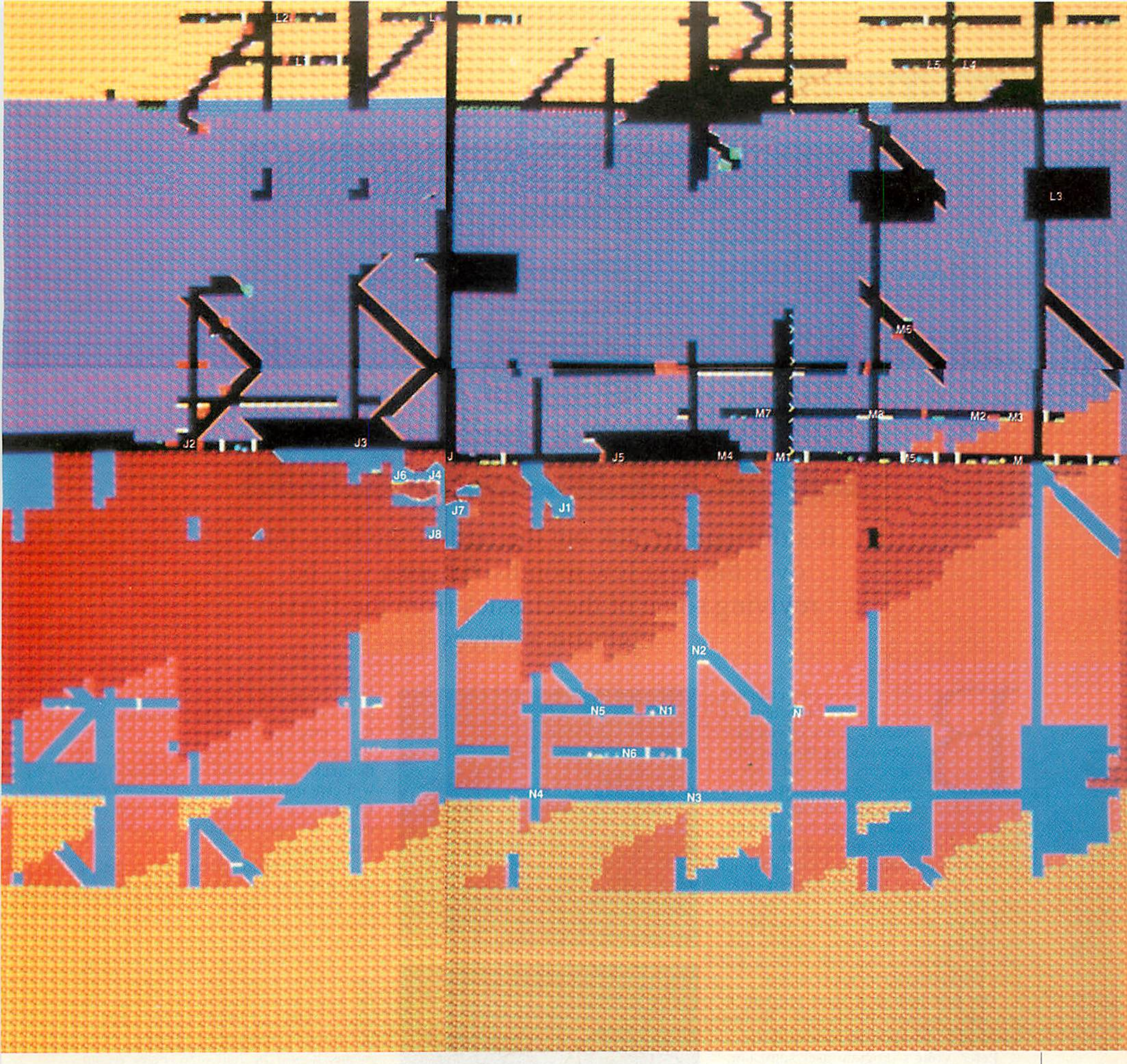
On the monthly disc, there's an OPL program in four procedures. Use *PFT* to load each procedure into your Organiser, giving each file the same name as it has on the disc. Translate these procedures and add the *Tennis* option to the main menu. Use the X and SPACE keys to move the paddle and keep the ball in play.



EXILED!

SAM GREENHILL reveals the final part of the Exile solution

(54) You should now be standing somewhere near (J7) with a dormant yellow slime. Take it up and <TH>/<F> it past the switch. <PS> to open the door, and <D> on the block. <PS> to close. When the block and slime floats up, <T> to (J), and <P> the slime. Get your RCD and a piranha from (J1). Take the lot to (O1), where the big fish should be eating the piranha.
(55)<}O2><R>. Get the slime to (O6), via (O3).
(56) Push the slime through to (O7). <}O5> and <G> <D> RCD so that it continually causes the door at (O8) to open. <}O6> <G> the piranha, <TH> right through the crack.
(57) Immediately <T> to (O2) and <SAVE>. When the suck in the centre cave sees the piranha through the open door the coronium boulder is sucked through the door and a trigger cell at (O9) opens the horizontal door, sucking you through too. When you are at (O9) <R>. It stops when the piranha is dead. Put the rock on the door and <}O9>. Take the rock to (J3). <SAVE>.
(58) Repeat steps (53-57) for a second boulder. If you're clever you'll make use of the stored position at (O9) to avoid the piranha business of (56) again. <SAVE>.
(59) Separately, take the two rocks to (G) making sure they never touch. <D> rock one on the rune door. <}G2> <R>. Take the other to the 'island' just above (G) and <D>. <*>.
(60) Go and get the flask and Chatter. <D> flask, take Chatter to (P2). He will kill the birds. Get a flask of water to (P3) and pu out the fire.
(61) <}P4> <D> empty flask on the gargoyle. <}P6> <P>. <}P7> and <F> the imps. <P> fire-proofing device. Destroy the teleporting robot.
(62) <}P> <}Q>. <F> invisible wasps, and <PS>. This closes the door at (Q1).
(63) When you meet Teleporting Droid Two, <}K1> <R> <}K>. Wait for Droid, then <T> <PS>. <}R>.
(64) <}R1> and <F> the hive to stop the suck. Locate the Blaster and <P>.
(65) <}R2> <F> the imps. Get a coronium crystal then <}R3>. Note the suck that likes dormant slimes. <SAVE>.
(66) <}R4> Get a slime to <R6>. <}R3> and stand to the right of the acid drips. Use the Blaster to divert drips onto the slime.
(67) <SAVE>. <}R6> <P>. With a combination of a boosted jump, <FUL> <TH> up and left and <F> get†the rock clear of the suck at (R3). <SAVE>. Catch it and take it to (R5). If you fail here, try again with the saved game.
(68) Repeat steps (66-67) and blow the door at (R5).
(69) <P> the mushroom immunity pill.
(70) <}Q1>, waste the imps and <}Q2>.
(71) Burn the invisible frogman at (Q3). <}Q4>.
(72) Burn some worms and <}Q5>. <P> the cannon RCD.
(73) <}R7> <}S>. Burn the bats here and at (S1).



(74) Get a coronium crystal and <}S2>. Just below you is a very nasty turret indeed. 'Drop' a few icer bullets in front of it and watch it roast the three doors between (S3) and (S4). From (S2), <D> the coronium crystal down to (T).

(75) <}S4> (quickly). <R> <FR> to (S3). Near the turret it fires a slow moving shell which should destroy it. If not <T> <R> and try again. <FL> <F> imps, <P> key at (S5). <}U> <}U4>.

(76) Droid 3 resides here. Destroy it at (K) or with the cannon at (B1).

(77) Ensure you have both RCDs then <}A>. <}B1> RCD the transporter, push the cannon in. Get the cannon to (B5).

(78) Blow the door at (B5). Move the cannon through (C) to (C5). Get it and the pink chest in the transporter to (F1). Waste the turret at (F2) and get them both to (K) via the transporter above (F5). Move the cannon to the edge near (K1) and blow the door opposite.

(79) <SAVE> then shoot the table across to the transporter, then turn the cannon round to face right, and <F> it at yourself. This will get it across. Transport them both to (T1).

(80) <SAVE>.

(81) Destroy the turret through the crack. Get the flask.

(82) <TH> RCD through crack to <PS> at (T2). Use the cannon to get to (T2). The strongest of Triax's robots resides here. Destroy it at (K) while firing plasma bolts at it, or use a nuclear explosion from the slimes at (M3).

(83) Position the chest at (T2) and <D> the flask on top of it just under the switch. Get the cannon to (T5). Stand on top of it and shoot the door at (T4). Then push the cannon down and end up both of you at (T6). <SAVE>. Explore. Notice anything of interest?

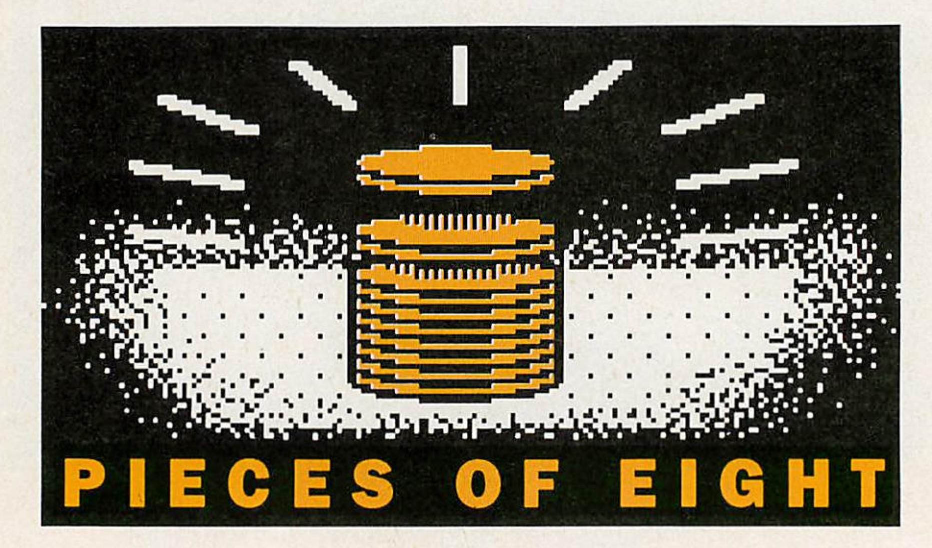
(84) Get the cannon to (T9). <R> <}T7>. Switch on the transporter though the crack to divert the worms to (U1). <T>. Blow the door at (T9) but not the switch.

(85) This is the fun bit. Scroll down so you see the horizontal door valve below you. When you <PS> the door closes. So every time the door opens, <PS> to close it. Keep going until the water level rises enough to blow up the maggot machine and cause an earthquake. <SAVE>.

(86) <}T10>. Switch off transporter and get the Destinator. Transport it and yourself to (U1). <}U2> <PS> <}U4>. Rescue the two zombies, noting that they are more fragile than a china egg. Get them and the Destinator into the transporter at (U3).

(87) <SAVE>. Float them up to (S6) but don't be with them as they go past (S3) if the turret is still there. If Triax steals the Destinator, you'll have to go back and get it again. Transport them to (K) then drop them down to (H). Set it up so they transport to (C3) to (B1) to (A). You can keep Triax off your back by putting him in an endless loop at (E1) and (G1). Test it with a bullet. It will keep him busy for a while.

(88) Putting the Destinator in the upper cabin at (A) causes the spaceship to fly away so you might consider leaving it safely in the lower cabin while you return and mop up any creatures that still remain, so that you can maximise your score.



PIECES OF EIGHT

It's difficult to pick out the best of the best, but over the next few months, **PAUL JAMES** will be reviving some of the classics from the BAU eight-bit archives

BBC Acorn User celebrated its hundredth birthday recently. Some of you have been reading the magazine since its birth, but a lot of you have acquired your Beebs more recently and may have missed many of the excellent eight-bit programs. Now's your chance to catch up, and a chance for you veterans to dig out your old copies and renew some of the best eight-bit programs ever written.

I begin this series with a couple of simple, but very infectious, graphics programs. I guarantee that both of them will keep you enthralled for hours on end.

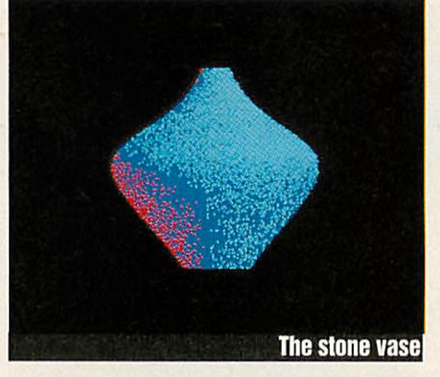
The first item is a short program to generate realistic 3D images. It first appeared in the April '86 issue of *BAU*

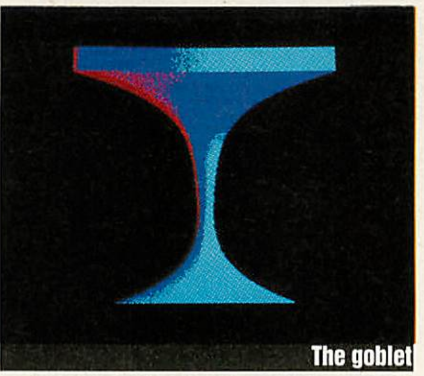
Peter Voke's program uses some simple maths to take 3D shading routines to the limits of reality. With a few simple rules you can generate almost any shape and the program will, according to the angle of the surface, light it appropriately.

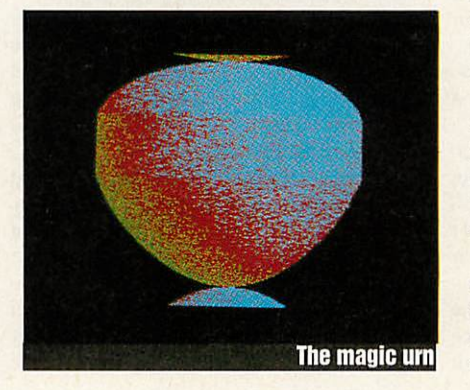
The program really only generates 2D shapes that are symmetrical about the vertical axis. This dramatically reduces the amount of maths needed, and speeds things up considerably. The three dimensional effect comes from the shading method used.

The program allows you to enter values that alter the shape of the object. There are a few supplied in figure 1, but Peter recommends that you experiment to generate more interesting objects.

To use Peter's program, first select option 1 to create a screen. Option two will preload a created screen. This allows you to create montages or more complex shapes by overlaying a plot over an already saved object.


The stone vase


The goblet


The magic urn

On selecting the Create screen option you have to enter some values that affect how the image is plotted. First comes 'fineness'. This alters the number of dots that make up an object. A fineness of one will give maximum pixel density. Using a fineness (or coarseness!) of eight will ensure the object is plotted faster, although much rougher.

The next option is the Scatter option. This will vary the 'spread' of the dots that are plotted, a higher scatter value will create a grainy effect, no scatter will give a 'sharp' image imitating glass or metal.

The next two inputs alter the size of the object in the x and y axes. A value of 100 for both means that it will occupy the whole width and height of the screen (if the formula states this), a value of 50 means it will be half size. Peter recommends that you use a value of 40 or 50 and a fineness of four for development work. For final production, values of 90 for size and a fineness of one will render the object to maximum quality.

The next two numbers, X-SHIFT and Y-SHIFT alter the position of the object on the screen. They range from -125 to +125, so for example, entering values of -100 and 0 will plot the object 100 units to the left of the centre of the screen. If both are zero the object will be central.

The next group of options tailor the shape of the object based on a simple formula. Peter's program calculates the radius at a given point by deriving it from the height of the point from the bottom of the object.

First you must choose from the three types of equation. Choosing R as a function of Y can be used to produce elegant shapes, like glasses. R squared gives somewhat rougher shapes with more pro-

Illustration by Andy Martin

nounced curves, it's the only way to generate a sphere. Peter includes R inverse as an extra function for other effects.

Peter suggests a few simple guidelines to help you in creating shapes.

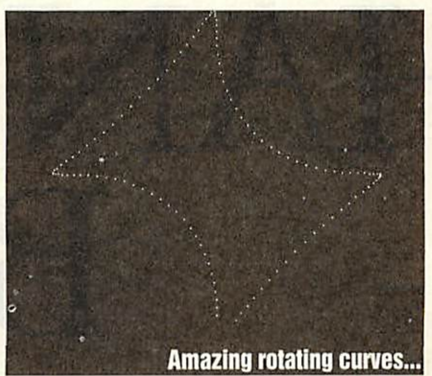
Y runs from -1 at the bottom of the shape to +1 at the top. R should not go over 1. If it does, a straight side will be created, like in the magic urn. When R goes under 1 the curve is inversed, like the ball in the stem of the goblet. If you create a cylinder then you know R was out of range all the way up the object!

For images that are mirrored along their horizontal centre line ensure that the coefficients of Y and Y^3 are zero, and to get a shape that has a point at the top the five coefficients must add up to zero.

Lastly, you can change the screen colours by using keys f0 to f4. Each one will cycle one of the four colours through the eight available, try it.

Pressing S will save your screen, pressing C will return you to the menu for another attempt.

Try varying the values given in table 1 by small amounts. Before long you'll have built a collection of rendered objects, either for looking at or using in artwork.


Amazing rotating curves...


...plotted in real time

Name	Red Planet	Goblet	Magic Urn	Bubbly	Wine Glass	Stone Vase
Fineness	1	1	1	1	2	1
Scatter	10	10	9	2	0	10
Scale	90	90	90	90	70	50
X Shift	0	0	0	0	0	0
Y Shift	0	0	0	0	0	0
Choice	2	1	2	1	1	3
<var>	1.0	0.08	1.0	0.08	0.22	1.0
+Y*	0	0.18	0.7	0.12	0.3	<ret>
+Y^2*	-1.0	-0.18	-1.0	0.24	-0.3	2
+Y^3*	<ret>	0.18	-0.7	0.48	-0.3	2
+Y^4*	<ret>	1.0	-0.2	0.96	0.3	2
Preload	<ret>	<ret>	<ret>	<ret>	<ret>	<ret>

Table1. Try these variables for interesting effects

The second program this month is a stunning rendition of a lissajous curve – in fact, many lissajous curves. These pulsate and rotate with a speed that will leave you breathless.

A warning from me here, two hours is the recommended time span staring at a screen before your eyes begin to turn square.

Michael St Aubyn is the author of this little graphics gem, which first appeared in the November '85 issue. He explains that the program simulates the effect seen on oscilloscopes when the single dot is controlled by sine waves in both the x and y axes, you may have seen this effect used on programs like the *Time Tunnel* and *Lost in Space*, guess who's watching too much late night TV!

Michael explains that the program achieves the speed needed for animation by first calculating tables. These tables are then used to look up the sine for a certain value, much faster than calculating them on demand!

The animation consists of 256 dots, each one plotted separately. Unlike an oscilloscope, the previous pattern does not fade away, therefore smooth animation is achieved by first plotting the 256 dots, then plotting the next series and then removing the old ones, ensuring that the trace is always visible.

You can affect the curve while the program is running by using a number of keys. The cursor keys change the horizontal and vertical frequency of the dots and many different curves can be created. Pressing RETURN resets the frequencies to 1 and the familiar rotating dumbell reappears. Pressing SPACE freezes the display and shows the current frequencies in use.

These are not the only changes you can make. Michael suggests that you also fiddle with the program itself by changing certain variables. For instance:

- phasediff determines the phase difference between the x and y waveforms from which the pattern is composed, and this affects the rotation
- xspeed and yspeed control the velocity of the waveforms. Doubling them will double the speed of the pattern
- xfreq and yfreq set the frequency of each waveform, try setting xfreq to 1 and yfreq to 127

The program starts with the dumbell pattern, this can be changed by changing lines 440 and 490. Michael suggests the following replacements:

```
440 x=SIN a
490 xfreq= -2:yfreq=-1
440 x=SIN(PI*SIN a)
490 xfeq=-1:yfreq=1
440 x=SIN(a*A%/255)
490 xfreq=-1:yfreq=1
```

In the examples so far all the y values have been calculated by using y=x. However many interesting effects can be obtained by using different functions for x and y. Try this for instance:

```
440x=SIN(a*A%/255)
460y=COS(a*A%/255)
490 xfreq=-1:yfreq=1
```

There are of course many other possibilities. Functions that include trigonometry generally produce the best results, but powers, logarithms and quadratic equations are worth experimenting with.

Well that's it for this month, hope you enjoy the two programs. Look out for next month's article, what's in it? Well you'll have to wait and see...

Have you ever needed a program to do something, but weren't sure which one, or indeed if there was one, that would fit the bill? Perhaps BAU *has published just what you needed.*

Why not write a description of what you would like an eight-bit program to do? Then send it to us at: Pieces of Eight, BBC Acorn User, *20-26 Brunswick Place, London N1 6DJ. We might be able to help.*

HANDLE BARS

In the National Curriculum datahandling is paramount as far as IT is concerned. The curriculum web shown here illustrates this point. This month and next, I intend to look at two software tools designed to assist in this area: database management software and spreadsheets.

As far back as 1981 it was recognised that children often spent a great deal of time collecting data, yet relatively little time in interpreting it. The pendulum has swung the other way with the classroom computer being called upon more than ever to help children focus upon the interpretation of data. Children learning to use the classroom computer to create databases and spreadsheets as part of their project work will gradually develop an understanding of how to handle information.

The purposes for using databases in the classroom therefore are threefold:

- As a source of information to support children's project work
- As a means for helping children become effective information handlers
- As a means of supporting the role of concrete experience in learning

A principle to keep in mind is that it is not only the interrogation of information in a computer database that is valuable but also the collection, organisation and presentation of data which helps children see the value of information as a resource. Database management software is very well represented on Acorn eight-bit computers. *BBC Acorn User* has evaluated the usefulness of such programs in the past (see the February '89 and June '89 issues).

The Archimedes series is an ideal information handling environment, as speed and memory are all important for successful searching, sorting and presentation of data.

The range of database management systems for the Archimedes series is expanding rapidly at all levels with the exception of special educational needs: I am unaware of anything matching the simplicity of *List Explorer* (NCET) for example.

DataSweet is a system ideally suited for introducing primary-aged children to datahandling in the National Curriculum. It comprises an integrated suite of very simple and attractive programs representing a database manager, a spreadsheet and a graphical presentation program. For anyone with doubts about the effectiveness of a Wimp environment for primary children, *DataSweet* will dispel them immediately.

The database manager is in fact three variations of the same program. *DataCard* uses keywords as an aid to searching and sorting while *DataPick* uses small, sprite pictures in place of keywords for the same purpose. *DataFind* uses the conventional method of using search strings to locate information stored in fields.

The three programs share a common attractive format which permits up to eight lines of text per record. Data can be 'dragged' from one program to the other or dropped into *DataPlot*, the graph drawing program. It produces colourful pie charts, bar charts, line bars or line graphs.

The spreadsheet, *DataCalc*, has a limited range of cells (6x20 matrix) into which files can be dragged. As each cell containing a formula is highlighted, it reveals its formula, rather than the usual end-calculation. This feature helps children to understand the workings of spreadsheets.

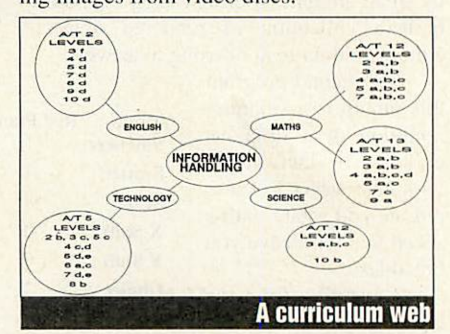
Each component of *DataSweet* is very limited in its scope and versatility but this is, of course, the suite's inherent strength: it introduces the principles of information handling on a computer simply and attractively and in a way that should engender confidence among primary teachers.

Key is undoubtedly the most popular datahandling software in British schools (close to 30,000 copies), probably due to its flexibility, affordable price tag and the substantial support provided by the ITV companies. *Key Plus*, the enhanced Archimedes' version, is a much improved version of its predecessor but maintains close links with it.

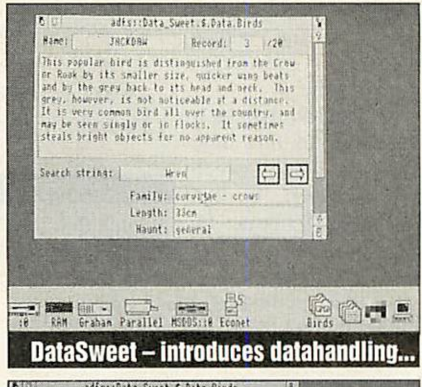
It can be run simply as a full Arc version of the original *Key*, in which converted *Key* datafiles (including Key 128 and Econet versions) can be accessed, although there will be limitations with the mapping feature. The virtue of this mode of *Key Plus* is in its familiarity. But the full Risc OS windowed mode is where the power and versatility of *Key Plus* become apparent.

Apart from the speed increase and improved graphical presentation, there are new features: *Key Plus* is a true relational database system accessing records from a number of open datafiles. You can now design your own form for displaying and printing data and numeric fields have been greatly improved. The graphing and mapping abilities really impress and there's lots more. Existing *Key* datafiles like the popular *Animals In Action* and *Earth Sciences* series will be converted for *Key Plus* and will include enhanced mapping facilities.

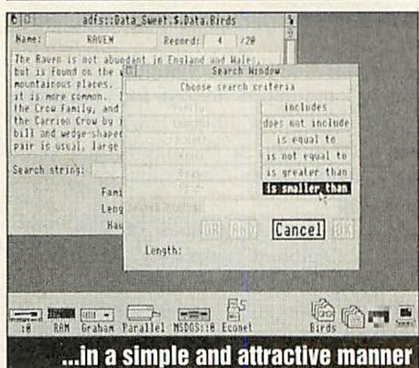
Key Plus can control Philips or Sony Laservision players where a video frame grabbing capability is available for displaying images from video discs.



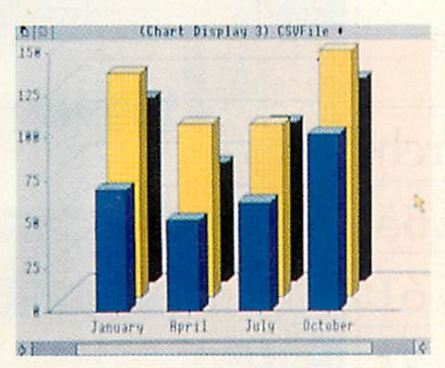
A curriculum web



DataSweet – introduces datahandling...



...in a simple and attractive manner



CHRIS DRAGE examines the importance of datahandling in the National Curriculum, and checks out the software which helps to teach it

Further developments include an integrated mapping system and data links with loggers like Phillip Harris' *EMU/Datadisc Plus*, *LogIT* (Griffin & George) and the Advisory Unit's *Weather Station*. Datafiles will enjoy compatibility with *Genesis* (Oak Solutions) and a primary version of *Key Plus* should be available by the time you read this. *Key Plus* is well placed to continue where *Key* left off, offering improved speed and excellent graphical capabilities.

If your school operates a number of different computer systems, you may decide that the advantage of providing a common datahandling environment outweighs the power and aesthetics of Risc OS software.

DataKing provides just such an environment, consistent for a range of computers (Archimedes, BBC B, Master 128, Nimbus PC-186) and it can work over Econet.

In looks it is not unlike *Grass* or *Key* but lacks the latter's mapping feature, making up for it by providing a comprehensive selection of 12 graph types incorporating both raw data and frequency distribution. An outline option for graphs is provided so pupils can colour in the bars – a nice touch!

The package actually comprises three separate database managers: *DataKing1*, a Ram based system suited to primary pupils, through to *DataKing3* for secondary students, capable of handling large files. Elementary analysis tools (eg, mean, line of best fit) and a calculator facility means that *DataKing* can be used to plot anything from plant growth rates to sports day results and really meets National Curriculum datahandling requirements very well.

An optional package, *DataTrans*, will convert almost any data format to that of another, which is very useful if you wish to use datafiles created on other packages.

The idea of integrated software is not new on Acorn computers – remember *Mini Office*? Minerva Systems has published a similar suite of programs for the Archimedes' series called *Desktop Office*, including an integrated spreadsheet and database manager with wordprocessor and communications software.

Again, the advantage of this system for schools lies in its limitations rather than its versatility. *DTOBase*, for example, is relatively easy to use with its cassette recorder-style control panel and the ease with which you can design card layouts. Searching, creating subsets and sorting, etc, are well up to Minerva's standard and although the menus may take a little while to get used to, *DTOBase* does perform well.

Similarly, *DTOSheet* is a straightforward 'no-frills' spreadsheet which may not necessarily meet the needs of the school office but would more than suffice for a secondary group's 'mini enterprise'.

Of the other programs in the suite, *DTOChart* (above) stands out as a super graph plotting program which accepts data directly from *DTOSheet* and *DTOBase*. Up to three sets of data can be used concurrently and each graph can be scaled manually or automatically and saved as a complete sprite if necessary for DTP work.

The remaining programs include *DTOWord* – the Archimedes' answer to *Wordwise*(!) – and *DTOComms* which will only be of use if your school communicates regularly via a modem.

DTO is a mixed bag of programs which, overall, do represent very good value. To purchase the equivalent individual programs would amount to considerably more than its asking price. It should happily find a niche in lower secondary departments.

For a full Risc OS-compliant, multitasking database manager which will share data with *DTP*, *!Edit*, *Pipedream*, *Graphbox*, etc, then *Flexifile* will not disappoint. Easier to use than *Multistore*, it is a fully relational database with some powerful features. Multiple files can be open at the same time with relational linking between any two of them (without the need for any bespoke programming). Cards can contain sprite images in addition to textual and numeric data.

Of particular interest to schools is its unique 'soundex' searching system which allows even misspelt items to be found. Mathematics can be performed using the macros allowing, for instance, age to be calculated from date of birth. Indices allow browsing of the records in more than one order without performing sorts. Like *Multistore*, *Flexifile* can generate comprehensive reports and gives you full control over the creation and editing of card/report/label formats.

The only reservation I have about *Flexifile* is its price, which I fear the education market will just find too steep.

Lastly, for this month, a word about *Quest*. I must confess I have never been a fan of this particular program, but the Advisory Unit has made an effort to provide alternative query commands which are related more to natural language and the program is considerably enhanced from the original BBC version.

Furthermore, the AU is committed to supporting *Quest* users by publishing datafiles and related resources totally in the context of the National Curriculum.

The first of these is the *Migration Pack* for key stages 2 to 4 which has been produced in conjunction with the *RSPB Migration Pack*.

It aims to introduce bird migration to children via the media of datahandling with a computer and related resources including a disc of datafiles, a set of workcards, a handbook and an RSPB video entitled *Migration Mystery Tours*. In this it succeeds extremely well. In order to make use of this pack however, you will also require *QMAP* (Advisory Unit).

● Key Plus *is available from ITV Association, 6 Paul Street, London EC2A 4JH. The cost for Archimedes/A3000 owners is: Single copy £50; For primary schools with less than 150 pupils £60; with more than 150 pupils £75; Middle schools £100; Secondary schools with less than 800 pupils £120; with more than 800 pupils £150.*

● DataSweet *is available from Kudlian Soft, Hampshire Microtechnology Centre, Connaught Lane, Portsmouth, PO6 4SJ. Price: £30 (primary); £60 (secondary).*

● Desktop Office *and* Flexifile *are available from Minerva Software, Minerva House, Baring Crescent, Exeter EX1 1TL. Price: £129.95 and £149 respectively.*

● DataKing *and* DataTrans *are available from Shenley Software, 5 Coombefield Close, New Malden, Surrey, KT3 5QF. Price: £49 and £18 respectively.*

● The Migration Pack *(requires* Quest *£30,* QMap *£30) is available from the Advisory Unit for Microtechnology in Education, Endymion Road, Hatfield, Herts, AL10 8AU. Price: £25.*

PUT SOME COLOUR BACK...

Results — 1990					
	January	February	March		
J Smith	75	70	55		
S Bowes	65	60	61		
A Williams	80	78	71		
S Watson	55	66	55		
R Wyatt	68	63	56		
AVERAGE	69	67	60	67	6
				Overall Average	6

SCHEMA
SPREAD SHEET PROGRAM

80
70
60
50
40
30
20
10
0

J Smith S Bowes A Williams S Watson R Wyatt

...INTO YOUR REPORTS

If you're excited by figures, then Clares *Schema* will amaze you with its abilities. You can perform almost any type of calculation on a set of figures including Financial, Statistical or Mathematical operations. You can even pass data between upto fifty different spreadsheets.

But if you find all things mathematical tedious then let *Schema* do the hard work for you. You can even automate those boring but necessary tasks such as weekly or monthly summaries.

Not only will it help you make sense of previously incomprehensible figures, but you can display them in various graph formats — all in glorious colour. The graphs can then be incorporated into DTP packages such as Clares Tempest for really professional reports which will impress your colleagues. Your reports will never be dull again.

Schema runs on all Archimedes and BBC A3000 computers with at least 1 Mb of memory and RISC OS.

Price £129.95 (Education £99.95)

Schema was produced in association with Acorn Computers Ltd.



98 Middlewich Road, Rudheath, Northwich, CHESHIRE CW9 7DA.
Telephone: 0606 48511 Fax No: 0606 48512

COMPATIBILITY

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	Arc	6502SP/ Turbo	ADFS	Econet	Shadow Ram	Monthly Disc
Risc Revue	30						■		■	■	■	■
Eight Bits	57											
Listing 1		■	■	■	■	■		■	■		■	■
Listing 2 (1)		■	■	■	■			■	■	■	■	■
Death before Dishonour	64						■		■	■	■	■
Psion Transfer	72						■		■	■	■	■
Pieces of Eight	76											
Listing 1		■	■	■	■	■	■	■	■	■	■	■
Listing 2		■	■	■	■	■		■	■	■	■	■

Note (1) Wordwise + segment language

RISC REVUE

Listing 1

```
10 REM >Biomorph (RR1)
20 REM by A F Reysenbach
30 REM for Archimedes only
40 REM (c) BAU March 1991
50 :
60 b=0:p=1
70 x=2:y=3:r=4
80 i=5:s=6:j=7
90 c=8:t=9:u=10
100 link=14:pc=15
110 shift1=1
120 shift2=2
130 dec=6
140 const1=66
150 const2=213
160 MODE 15
170 OFF
180 DIM biomorph 200
190 FOR pass=0 TO 2 STEP 2
200 P%=biomorph
210 [OPT pass
220 .pix
230 SUBS p,p,#1
240 MOVMI pc,link
250 MOV x,p,LSR #8
260 AND y,p,#&FF
270 MOV c,#264
280 SUB r,x,#276
290 MOV r,r,ASL #shift1
300 SUB i,y,#128
310 MOV i,i,ASL #shift2
320 .iter
330 SUBS c,c,#dec
340 BMI pix
350 MUL s,r,r
360 MUL j,i,i
370 ADD t,j,j,ASL #1
380 SUB t,s,t
390 MUL t,r,t
400 MOV t,t,ASR #16
410 SUB t,t,#const1
420 ADD u,s,s,ASL #1
430 SUB u,u,j
440 MUL u,i,u
450 MOV u,u,ASR #16
460 SUB u,u,#const2
470 MOVS r,t
480 RSBMI t,t,#0
490 MOVS i,u
500 RSBMI u,u,#0
510 CMP t,#10<<8
520 BGE maybe_plot
530 CMP u,#10<<8
540 BGE maybe_plot
550 ADD s,t,u
560 CMP s,#10<<8
570 BGE maybe_plot
580 B iter
590 .maybe_plot
600 CMP t,#10<<8
610 BLT plot
620 CMP u,#10<<8
630 BLT plot
640 B pix
650 .plot
660 MOV t,y,ASL #9
670 ADD t,t,y,ASL #7
680 ADD t,t,x
690 STRB c,[b,-t]
700 B pix
710 :
720 .scr
730 EQUD 148
740 EQUD -1
750 ]
760 NEXT pass
770 SYS "OS_ReadVduVariables",scr,scr
780 A%=!scr+&27FFF
790 B%=552<<8
800 CALL biomorph
810 ON
820 END
```

Listing 2

```
10 REM >Gask1 (RR2)
20 REM by Dave Lawrence
30 REM for Archimedes only
40 REM (c) BAU March 1991
50 :
60 MODE 15
70 OFF
80 PROCcode
90 CALL gasket
100 END
110 :
120 DEF PROCcode
130 xpos=1
140 ypos=2
150 rand=3
160 addr=4
170 byte=5
180 count=6
190 scr=8
200 cornersx=9
210 cornersy=10
220 xor=11
230 seed=12
240 sp=13
250 link=14
260 pc=15
270 DIM code 1000
280 FOR pass=0 TO 2 STEP 2
290 P%=code
300 [OPT pass
310 .gasket
320 LDR xor,xor%
330 LDR seed,seed%
340 LDR scr,scr%
350 ADR cornersx,cornersx%
360 ADR cornersy,cornersy%
370 MOV xpos,#0
380 MOV ypos,#0
390 MOV byte,#&FF
400 LDR count,number%
410 .loop
420 MOVS seed,seed,LSL #1
430 EORCS seed,seed,xor
440 MOVCC rand,#0
450 MOVCS rand,#1
460 MOVS seed,seed,LSL #1
470 EORCS seed,seed,xor
480 ORRCS rand,rand,#2
490 CMP rand,#3
500 BEQ loop
510 LDR R0,[cornersx,rand,ASL #2]
520 ADD xpos,R0,xpos,ASR #1
530 LDR R0,[cornersy,rand,ASL #2]
540 ADD ypos,R0,ypos,ASR #1
550 ADD addr,scr,ypos,ASL #7
560 ADD addr,addr,ypos,ASL #9
570 STRB byte,[addr,xpos]
580 SUBS count,count,#1
590 BNE loop
600 MOV pc,link
610 :
620 .scr%
630 EQUD 148
640 EQUD -1
650 .seed%
660 EQUD TIME
670 .xor%
680 EQUD &1D872B41
690 .number%
700 EQUD 250000
710 :
720 .cornersx%
730 EQUD 0/2
740 EQUD 640/2-1
750 EQUD 640/4-1
760 .cornersy%
770 EQUD 0/2
780 EQUD 0/2
790 EQUD 256/2
800 ]
810 NEXT pass
820 SYS "OS_ReadVduVariables",scr%,scr
%
830 ENDPROC
```

Listing 3

```
10 REM >Gask2 (RR3)
20 REM by Dave Lawrence/Dave Acton
30 REM for Archimedes only
40 REM (c) BAU March 1991
50 :
60 MODE 15
70 OFF
80 PROCcode
90 CALL gasket
100 END
110 :
120 DEF PROCcode
130 xpos=1
140 ypos=2
150 rand=3
160 addr=4
170 byte=5
180 was=6
190 wascount=7
200 scr=8
210 cornersx=9
220 cornersy=10
230 xor=11
240 seed=12
250 sp=13
260 link=14
270 pc=15
280 maxsame%=256
290 DIM code 1000
300 FOR pass=0 TO 2 STEP 2
310 P%=code
320 [OPT pass
330 .gasket
340 LDR xor,xor%
350 LDR seed,seed%
360 LDR scr,scr%
370 ADR cornersx,cornersx%
380 ADR cornersy,cornersy%
390 MOV xpos,#0
400 MOV ypos,#0
410 MOV byte,#&FF
420 MOV wascount,#0
430 .loop
440 MOVS seed,seed,LSL #1
450 EORCS seed,seed,xor
460 MOVCC rand,#0
470 MOVCS rand,#1
480 MOVS seed,seed,LSL #1
490 EORCS seed,seed,xor
500 ORRCS rand,rand,#2
510 CMP rand,#3
520 BEQ loop
530 LDR R0,[cornersx,rand,ASL #2]
540 ADD xpos,R0,xpos,ASR #1
550 LDR R0,[cornersy,rand,ASL #2]
560 ADD ypos,R0,ypos,ASR #1
570 ADD addr,scr,ypos,ASL #7
580 ADD addr,addr,ypos,ASL #9
590 LDRB was,[addr,xpos]
600 CMP was,#0
610 MOVEQ wascount,#0
620 STREQB byte,[addr,xpos]
630 ADDNE wascount,wascount,#1
640 CMP wascount,#maxsame%
650 BNE loop
660 MOV pc,link
670 :
680 .scr%
690 EQUD 148
700 EQUD -1
710 .seed%
720 EQUD TIME
730 .xor%
```

Continued ▶

RISC REVUE

◀ Continued

```
740 EQUD &1D872B41
750 :
760 .cornersx%
770 EQUD 0/2
780 EQUD 640/2-1
790 EQUD 640/4-1
800 .cornersy%
810 EQUD 0/2
820 EQUD 0/2
830 EQUD 256/2
840 ]
850 NEXT pass
860 SYS "OS_ReadVduVariables",scr%,scr%
870 ENDPROC
```

Listing 4

```
10 REM >Gask3 (RR4)
20 REM by Dave Lawrence/Dave Acton
30 REM for Archimedes only
40 REM (c) BAU March 1991
50 :
60 MODE 0
70 OFF
80 PROCcode
90 max%=(HIMEM-END) DIV &5000-2
100 PRINT"Maximum number of frames=";max%
110 REPEAT
120  INPUT"Frames: "pics%
130 UNTIL pics%>0 AND pics%<=max%
140 DIM store% &5000*pics%
150 FOR picture%=0 TO pics%-1
160  CLS
170  scale=2^(picture%/pics%)
180  RESTORE
190  FOR i%=0 TO 5
200   READ v%
210   !(cornersx%+4*i%)=v%*scale
220  NEXT
230  CALL gasket
240  A%=!scr%
250  B%=store%+&5000*picture%
260  CALL blat
270 NEXT
280 picture%=0
290 dir%=1
300 del%=1
310 REPEAT
320  A%=store%+&5000*picture%
330  B%=!scr%
340  FOR d%=1 TO del%
350   WAIT
360  NEXT
370  CALL blat
380  picture%=(picture%+pics%+dir%) MOD pics%
390  CASE INKEY$(0) OF
400   WHEN " ":dir%=-dir%
410   WHEN "+","=":IF del%>1 del%-=1
420   WHEN "-","_":IF del%<25 del%+=1
430  ENDCASE
440 UNTIL FALSE
450 END
460 :
470 DEF PROCcode
480 temp=0
490 xpos=1
500 ypos=2
510 rand=3
520 addr=4
530 byte=5
540 xmod=6
550 wascount=7
560 scr=8
570 cornersx=9
580 cornersy=10
590 xor=11
600 seed=12
610 sp=13
620 link=14
630 pc=15
640 maxsame%=256
650 DIM code 1000
660 FOR pass=0 TO 2 STEP 2
670 P%=code
680 [OPT pass
690 .gasket
700 LDR xor,xor%
710 LDR seed,seed%
720 LDR scr,scr%
730 ADR cornersx,cornersx%
740 ADR cornersy,cornersy%
750 MOV xpos,#0
760 MOV ypos,#0
770 MOV wascount,#0
780 .loop
790 MOVS seed,seed,LSL #1
800 EORCS seed,seed,xor
810 MOVCC rand,#0
820 MOVCS rand,#1
830 MOVS seed,seed,LSL #1
840 EORCS seed,seed,xor
850 ORRCS rand,rand,#2
860 CMP rand,#3
870 BEQ loop
880 LDR temp,[cornersx,rand,ASL #2]
890 ADD xpos,temp,xpos,ASR #1
900 LDR temp,[cornersy,rand,ASL #2]
910 ADD ypos,temp,ypos,ASR #1
920 CMP xpos,#640
930 BGE loop
940 CMP ypos,#256
950 BGE loop
960 ADD addr,scr,ypos,ASL #4
970 ADD addr,addr,ypos,ASL #6
980 AND temp,xpos,#7
990 MOV byte,#1
1000 MOV byte,byte,ASL temp
1010 LDRB temp,[addr,xpos,LSR #3]
1020 TST temp,byte
1030 MOVEQ wascount,#0
1040 ORREQ temp,temp,byte
1050 STREQB temp,[addr,xpos,LSR #3]
1060 ADDNE wascount,wascount,#1
1070 CMP wascount,#maxsame%
1080 BNE loop
1090 MOV pc,link
1100 :
1110 .scr%
1120 EQUD 148
1130 EQUD -1
1140 .seed%
1150 EQUD TIME
1160 .xor%
1170 EQUD &1D872B41
1180 :
1190 .cornersx%
1200 EQUD 0/2
1210 EQUD 640/2-1
1220 EQUD 640/4-1
1230 .cornersy%
1240 EQUD 0/2
1250 EQUD 0/2
1260 EQUD 256/2
1270 :
1280 .blat
1290 MOV R12,#&5000
1300 .blatloop
1310 LDMIA (0)!,{r2-r9}
1320 STMIA (1)!,{r2-r9}
1330 SUBS R12,R12,#32
1340 BNE blatloop
1350 MOV pc,link
1360 ]
1370 NEXT pass
1380 SYS "OS_ReadVduVariables",scr%,scr%
1390 ENDPROC
1400 :
1410 DATA 0,319,159,0,0,128
```

Listing 5

```
10 REM >Recur (RR5)
20 REM by Dave Lawrence/Dave Acton
30 REM for Archimedes only
40 REM (c) BAU March 1991
50 :
60 MODE 0
70 OFF
80 PROCcode
90 max%=(HIMEM-END) DIV &5000-2
100 PRINT"Maximum number of frames=";max%
110 REPEAT
120  INPUT"Frames: "pics%
130 UNTIL pics%>0 AND pics%<=max%
140 DIM store% &5000*pics%
150 FOR picture%=0 TO pics%-1
160  CLS
170  scale=2^(picture%/pics%)
180  PROCtri(0,0,1279*scale,0,640*scale,1023*scale,0)
190  A%=!scr%
200  B%=store%+&5000*picture%
210  CALL blat
220 NEXT
230 picture%=0
240 dir%=1
250 del%=1
260 REPEAT
270  A%=store%+&5000*picture%
280  B%=!scr%
290  FOR d%=1 TO del%
300   WAIT
310  NEXT
320  CALL blat
330  picture%=(picture%+pics%+dir%) MOD pics%
340  CASE INKEY$(0) OF
350   WHEN " ":dir%=-dir%
360   WHEN "+","=":IF del%>1 del%-=1
370   WHEN "-","_":IF del%<25 del%+=1
380  ENDCASE
390 UNTIL FALSE
400 END
410 :
420 DEF PROCtri(x0%,y0%,x1%,y1%,x2%,y2%,d%)
430 LOCAL mx0%,my0%,mx1%,my1%,mx2%,my2%
440 IF d%<7 THEN
450  mx0%=(x0%+x1%)/2
460  my0%=(y0%+y1%)/2
470  mx1%=(x1%+x2%)/2
480  my1%=(y1%+y2%)/2
490  mx2%=(x2%+x0%)/2
500  my2%=(y2%+y0%)/2
510  PROCtri(x0%,y0%,mx0%,my0%,mx2%,my2%,d%+1)
520  PROCtri(x1%,y1%,mx1%,my1%,mx0%,my0%,d%+1)
530  PROCtri(x2%,y2%,mx2%,my2%,mx1%,my1%,d%+1)
540 ELSE
550  MOVE x0%,y0%
560  DRAW x1%,y1%
570  DRAW x2%,y2%
580  DRAW x0%,y0%
590 ENDIF
600 ENDPROC
610 :
620 DEF PROCcode
630 link=14
640 pc=15
650 DIM code 1000
660 FOR pass=0 TO 2 STEP 2
670 P%=code
680 [OPT pass
690 .blat
700 MOV R12,#&5000
710 .blatloop
720 LDMIA (0)!,{r2-r9}
730 STMIA (1)!,{r2-r9}
740 SUBS R12,R12,#32
750 BNE blatloop
760 MOV pc,link
770 :
780 .scr%
790 EQUD 148
800 EQUD -1
810 ]
820 NEXT pass
830 SYS "OS_ReadVduVariables",scr%,scr%
840 ENDPROC
```

Listing 6

```
10 REM >Decay (RR6)
20 REM by Bryan B Cloud
30 REM for Archimedes only
40 REM (c) BAU March 1991
50 :
60 MODE 13
70 OFF
80 screenwidth%=1280
90 DIM r%(319)
100 PROCass
110 SYS "XOS_CLI","RMENSURE ColourTrans 0 *RMLOAD System:Modules.Colours"
120 *RMENSURE ColourTrans 0 ERROR 0,Cannot find ColourTrans module
130 pt%=60
140 font$="Newhall.Bold"
150 SYS "XFont_FindFont",,font$,pt%*16,pt%*16*2,0,0 TO fonthand%;ok%
160 ok%=(ok% AND 1)=0
170 IF ok% THEN SYS "Font_SetFont",fonthand%
180 SYS "ColourTrans_SetFontColours",0,0,&FFFFFF00,14
190 PROCdemo("This is a short","demonstration")
200 PROCdemo("Risc Revue","Rules OK!")
210 IF ok% THEN SYS "Font_LoseFont",fonthand%
220 END
230 :
240 DEF PROCdemo(d1$,d2$)
250 *FX 112,2
260 CLS
270 PROCcentre(300,d1$)
280 PROCcentre(40,d2$)
290 *FX 112,1
300 CALL reset
310 FOR i%=0 TO 319
320  r%(i%)=i%
330 NEXT
340 FOR mix%=1 TO 800
350  SWAP r%(RND(320)-1),r%(RND(320)-1)
360 NEXT
370 i%=0
380 REPEAT
390  WAIT
400  IF !dotcount>0 AND i%<320 THEN
410   A%=r%(i%)
420   B%=RND(100)-1
430   CALL adddot
440   i%+=1
450  ELSE
460   CALL plot
470  ENDIF
480 UNTIL i%=320 AND !dotcount=dots
490 ENDPROC
500 :
510 DEF PROCcentre(y%,t$)
520 IF NOT ok% THEN
530  VDU 5
540  VDU 23,17,7,6,16;32|
550  MOVE screenwidth%/2-32*LEN(t$),y%+160
560  PRINT t$
570  VDU 4
580  OFF
590 ELSE
600  SYS "Font_StringWidth",,t$,10000000,10000000,-1,LEN(t$) TO ,,w%
610  SYS "Font_ConverttoOS",,w% TO ,w%
620  SYS "Font_Paint",,t$,%10100,screenwidth%/2-w%/2,y%+60
630 ENDIF
640 ENDPROC
650 :
660 DEF PROCass
670 dots=128
680 dot_accel=1<<12
690 :
700 dot_x=0
710 dot_y=4
720 dot_v=8
730 dot_size=12
740 :
750 DIM code 1000+dots*dot_size
760 xpos=0
770 ypos=1
780 yvel=2
790 col=3
800 ptr=4
810 count=5
820 addr=6
830 temp2=7
840 poke=8
850 temp=9
860 byte=10
870 num=11
880 cols=12
890 sp=13
900 link=14
910 pc=15
920 :
930 FOR pass=0 TO 2 STEP 2:P%=code
940 [OPT pass
950 .reset
960 MVN byte,#0
970 ADR addr,data%
980 MOV count,#dots
990 STR count,dotcount
1000 .resetloop
1010 STR byte,[addr],#dot_size
1020 SUBS count,count,#1
1030 BNE resetloop
1040 STR count,dotptr
1050 MOV pc,link
1060 :
1070 .adddot
1080 LDR count,dotcount
1090 CMP count,#0
1100 MOVEQ pc,link
1110 SUB count,count,#1
1120 STR count,dotcount
1130 ADR addr,data%
1140 LDR ptr,dotptr
1150 .findpos
1160 LDR byte,[addr,ptr]
1170 CMN byte,#1
1180 BEQ dothere
1190 ADD ptr,ptr,#dot_size
1200 CMP ptr,#dots*dot_size
1210 MOVEQ ptr,#0
1220 B findpos
1230 .dothere
1240 STR xpos,[addr,ptr]!
1250 MOV ypos,ypos,ASL #16
1260 STR ypos,[addr,#dot_y]
1270 MOV yvel,#0
1280 STR yvel,[addr,#dot_v]
1290 STR ptr,dotptr
1300 .plot
1310 ADR addr,data%
1320 LDR count,dotcount
1330 ADR cols,colours
1340 MOV num,#dots
1350 .plotloop
1360 LDMIA (addr),{xpos,ypos,yvel}
1370 CMN xpos,#1
1380 BEQ noplot
1390
1400 MOV temp,ypos,LSR #16
1410 LDR poke,screen
1420 ADD poke,poke,temp,ASL #6
1430 ADD poke,poke,temp,ASL #8
1440 ADD ypos,ypos,yvel
1450 ADD yvel,yvel,#dot_accel
1460 STMIA (addr),{xpos,ypos,yvel}
1470 .waiting
1480
```

Continued ▶

RISC REVUE

◀ **Continued**

```
1490 MOV col,#15
1500 .trail
1510 SUBS yvel,yvel,#dot_accel
1520 BMI trailed
1530 SUB ypos,ypos,yvel
1540 LDRB byte,[cols,col]
1550 MOV temp,ypos,LSR #16
1560 LDR ptr,screen
1570 ADD temp2,ptr,#80*1024
1580 ADD ptr,ptr,temp,ASL #6
1590 ADD ptr,ptr,temp,ASL #8
1600 CMP poke,temp2
1610 SUBGE poke,temp2,#320
1620 ADD temp,xpos,#80*1024
1630 .line
1640 CMP byte,#0
1650 LDREQB temp2,[poke,temp]
1660 STREQB temp2,[poke,xpos]
1670 STRNEB byte,[poke,xpos]
1680 SUBS poke,poke,#320
1690 CMP poke,ptr
1700 BGE line
1710 MOV poke,ptr
1720 SUBS col,col,#1
1730 BPL trail
1740 .trailed
1750 CMP ypos,#(256<<16)
1760 MVNGE xpos,#0
1770 STRGE xpos,[addr,#dot_x]
1780 ADDGE count,count,#1
1790 .noplot
1800 ADD addr,addr,#dot_size
1810 SUBS num,num,#1
1820 BNE plotloop
1830 STR count,dotcount
1840 MOV pc,link
1850 :
1860 .dotptr
1870 EQUD 0
1880 .dotcount
1890 EQUD 0
1900 .screen
1910 EQUD 148
1920 EQUD -1
1930 :
1940 .colours
1950 EQUD &03020100
1960 EQUD &2F2E2D2C
1970 EQUD &D3D2D1D0
1980 EQUD &FFFEFDFC
1990 ]
2000 data%=P%
2010 NEXT pass
2020 SYS "OS_ReadVduVariables",screen,s
creen
2030 ENDPROC
```

EIGHT BITS

Listing 1

```
10 REM Batch Processor
20 REM by M Lewis
30 REM for B/B+/E/M/C
40 REM (c) BAU Mar 91
50 :
60 osargs=&FFDA
70 oscli=&FFF7
80 store=&80
90 buffer=&C00
100 FOR pass=0 TO 3 STEP3
110 P%=&A00
120 PROCpass
130 NEXT pass
140 OSCLI "SAVE BATCH "+STR$~batch+" "
+STR$~(P%+1)+" "+STR$~batch
150 END
160 DEF PROCpass
170 [OPT pass
180 .batch
190 LDX #store
200 LDY #0
210 LDA #1
220 JSR osargs
230 LDY #0
240 JSR copy
250 LDY #0
260 LDX #0
270 JSR setvars1
280 LDY #0
290 JSR doexec
300 LDX #exec_text MOD256
310 LDY #exec_text DIV256
320 JSR oscli
330 LDA &216
340 STA oldvect
350 LDA &217
360 STA oldvect+1
370 LDA #readchr MOD256
380 STA &216
390 LDA #readchr DIV256
400 STA &217
410 RTS
420 .reset
430 LDA oldvect
440 STA &216
450 LDA oldvect+1
460 STA &217
470 LDY handle
480 LDX temp
490 SEC
500 RTS
510 .copy
520 LDX #0
530 .copy1
540 LDA (store),Y
550 STA buffer,X
560 INX
570 INY
580 CMP #13
590 BNE copy1
600 RTS
610 .setvars
620 TYA
630 CLC
640 ADC #buffer MOD256
650 STA vars,X
660 INX
670 LDA #buffer DIV256
680 ADC #0
690 STA vars,X
700 INX
710 .setvars1
720 LDA buffer,Y
730 CMP #ASC","
740 BEQ setvars2
750 CMP #13
760 BEQ setvars3
770 INY
780 JMP setvars1
790 .setvars2
800 INY
810 LDA buffer,Y
820 CMP #ASC","
830 BEQ setvars5
840 .setvars4
850 DEY
860 LDA #13
870 STA buffer,Y
880 INY
890 JMP setvars
900 .setvars5
910 TYA
920 PHA
930 .setvars6
940 INY
950 LDA buffer,Y
960 DEY
970 STA buffer,Y
980 INY
990 BNE setvars6
1000 PLA
1010 TAY
1020 JMP setvars1
1030 .setvars3
1040 RTS
1050 .doexec
1060 LDA buffer,Y
1070 STA exec_name,Y
1080 INY
1090 CMP #13
1100 BNE doexec
1110 RTS
1120 .readchr
1130 STX temp
1140 STY handle
1150 LDA flag
1160 BNE reADChr1
1170 JSR oldread
1180 BCC next1
1190 JMP reset
1200 .next1
1210 CMP #ASC"%"
1220 BEQ readchr2
1230 .readout
1240 LDY handle
1250 LDX temp
1260 CLC
1270 RTS
1280 .readchr2
1290 JSR oldread
1300 BCC next2
1310 JMP reset
1320 .next2
1330 CMP #ASC"%"
1340 BNE readchr3
1350 JMP readout
1360 .readchr1
1370 LDY pos
1380 LDA buffer,Y
1390 PHA
1400 INY
1410 LDA buffer,Y
1420 CMP #13
1430 BNE readchr4
1440 DEC flag
1450 .readchr4
1460 PLA
1470 STY pos
1480 JMP readout
1490 .readchr3
1500 SEC
1510 SBC #&30
1520 BMI error
1530 CMP #10
1540 BPL error
1550 ASL A
1560 TAX
1570 LDA vars,X
1580 STA pos
1590 INX
1600 LDA vars,X
1610 BEQ error
1620 LDA #1
1630 STA flag
1640 JMP readchr1
1650 .oldread
1660 JMP (oldvect)
1670 .oldvect
1680 EQUW 0
1690 .error
1700 JSR reset
1710 EQUS CHR$0+CHR$0+"No such paramete
r"+CHR$0
1720 .vars
1730 EQUD 0
1740 EQUD 0
1750 EQUD 0
1760 EQUD 0
1770 EQUD 0
1780 .handle
1790 EQUB 0
1800 .flag
1810 EQUB 0
1820 .pos
1830 EQUB 0
1840 .temp
1850 EQUB 0
1860 .exec_text
1870 EQUS"EXEC "
1880 .exec_name
1890
1900 ]
1910 ENDPROC
```

Listing 2

```
SELECT TEXT
DELETE TEXT
A%=1
R$=CHR$(13)
T$="SUNDAY"
U$="MONDAY"
V$="TUESDAY"
W$="WEDNESDAY"
X$="THURSDAY"
Y$="FRIDAY"
Z$="SATURDAY"
CLS
PRINT
PRINT
DOLINE "|B1140|Bce|GCALENDAR GENERATOR"
PRINT R$+R$+"NEW PAGE FOR EACH MONTH? Y/
N ";
B%=GET
PRINT CHR$(B%)
.yr
PRINT "ENTER YEAR ";
Y%=VAL(GLK$)
IF Y%<100 THEN Y%=Y%+1900
IF Y%>1900 THEN GOTO oky
PRINT "SORRY, ONLY YEARS AFTER 1900 ALLC
WED"+R$+"-  TRY AGAIN"
GOTO yr
.oky
L%=0
IF Y%MOD4=0 THEN L%=1
TYPE "|BES87,1|BLL40"
.mth
PRINT "ENTER START MONTH NO ";
M%=VAL(GLK$)
IF M%>0 THEN GOTO fday
PRINT "MONTH MUST BE IN RANGE 1-12"
GOTO mth
.fday
S%=(Y%+Y%/4)+(M%-1)*30+(M%+M%DIV9)DIV2
IF M%>2 THEN S%=S%-2+L%
S%=S%MOD7
IF S%=1 THEN S$=T$
IF S%=2 THEN S$=U$
IF S%=3 THEN S$=V$
IF S%=4 THEN S$=W$
IF S%=5 THEN S$=X$
IF S%=6 THEN S$=Y$
IF S%=0 THEN S$=Z$
.restart
IF M%>1 THEN GOTO feb
M$="JANUARY"
N%=31
GOTO follow
.feb
IF M%>2 THEN GOTO mar
M$="FEBRUARY"
N%=28+L%
GOTO follow
.mar
IF M%>3 THEN GOTO apr
M$="MARCH"
N%=31
GOTO follow
.apr
IF M%>4 THEN GOTO may
M$="APRIL"
N%=30
GOTO follow
.may
IF M%>5 THEN GOTO jun
M$="MAY"
N%=31
GOTO follow
.jun
IF M%>6 THEN GOTO jul
M$="JUNE"
N%=30
GOTO follow
.jul
IF M%>7 THEN GOTO aug
M$="JULY"
N%=31
GOTO follow
.aug
IF M%>8 THEN GOTO sep
M$="AUGUST"
N%=31
GOTO follow
.sep
IF M%>9 THEN GOTO oct
M$="SEPTEMBER"
N%=30
GOTO follow
.oct
IF M%>10 THEN GOTO nov
M$="OCTOBER"
N%=31
GOTO follow
.nov
IF M%>11 THEN GOTO dec
M$="NOVEMBER"
N%=30
GOTO follow
.dec
IF M%>12 THEN GOTO end
M$="DECEMBER"
N%=31
.follow
TYPE "|BCE|G"+M$+" "+STR$(Y%)+R$
PROC ul
PRINT M$
.sub
D%=1
IF S$=T$ THEN GOTO sun
IF S$=U$ THEN GOTO mon
IF S$=V$ THEN GOTO tue
IF S$=W$ THEN GOTO wed
IF S$=X$ THEN GOTO thu
IF S$=Y$ THEN GOTO fri
IF S$=Z$ THEN GOTO sat
.sun
Q$=T$
PROCtype
.mon
Q$=U$
PROCtype
.tue
Q$=V$
PROCtype
.wed
Q$=W$
PROCtype
.thu
Q$=X$
PROCtype
.fri
Q$=Y$
PROCtype
.sat
Q$=Z$
```

Continued ▶

EIGHT BITS

◀ Continued

```
PROCtype
GOTO sun
.type
IF D%>N% THEN GOTO nextmon
PRINT str$(D%)+" ";
TYPE Q$+R$+R$
IF D%<10 THEN TYPE " "
TYPE str$(D%)+R$
D%=D%+1
IF Q$="SATURDAY" THEN GOTO weekend
PROC ul
ENDPROC
.ul
TYPE"|Bus|G

            |Bue|G"+R$
ENDPROC
.weekend
TYPE "==================================
======"+R$
ENDPROC
.nextmon
PRINT
A%=A%+1
M%=M%+1
S$=Q$
IF B%=89 THEN GOTO ff
IF B%=121 THEN GOTO ff
TYPE "**********************************
*****"
TYPE R$+R$+R$
GOTO restart
.ff
TYPE "|BOC12|G"
GOTO restart
.end
|Bes64|G
```

DEATH BEFORE DISHONOUR

Listing 1

```
   10 REM Death Before Dishonour
   20 REM by David Radford
   30 REM for Arc only
   40 REM (c) BBC Acorn User March 1991
   50 :
   60 MODE15
   70 MODE12:OFF
   80 DIM ship1% 256,ship2% 256
   90 DIM shipdata% 256
  100 DIM suntab% 1024,stars% 100*8
  110 sunrad%=50
  120 xgap%=&10:ygap%=&10
  130 hyperstep%=8
  140 airres%=5
  150 maxfuel%=512
  160 maxammo%=32
  170 maxshi%=0
  180 turn%=5
  190 bullen%=30
  200 :
  210 RESTORE +0
  220 READ numpts%
  230 FOR T%=0 TO numpts%*8-8 STEP 8
  240 READ shipdata%!T%,shipdata%!(T%+4)
  250 NEXT
  260 FOR T%=0 TO 1024-4 STEP 4
  270 suntab%!T%=sunrad%*RND(1)/3+sunrad
%/3*2
  280 NEXT
  290 FOR T%=0 TO 99*8 STEP 8
  300 stars%!T%=RND(639)<<5:stars%!(T%+4
)=RND(255)<<5
  310 NEXT
  320 :
  330 PROCassem
  340 :
  350 FOR T%=0 TO numpts%*8-8 STEP 8
  360 X%=shipdata%!T%:Y%=shipdata%!(T%+4
)
  370 X%=SQR(X%*X%+Y%*Y%)
  380 IF X%>!rad3 !rad3=X%
  390 NEXT
  400 :
  410 DATA 5
  420 DATA 0,36, -20,-20, -4,-8 ,4,-8, 2
0,-20
  430 :
  440 SYS "OS_Byte",112,2:CLS
  450 SYS "OS_ReadVduVariables",vdublock
,screen
  460 D%=0
  470 PROCtext(14,0,"Player 1")
  480 PROCtext(58,0,"Player 2")
  490 PROCtext(4,1,"Ammo")
  500 PROCtext(16,1,"Fuel")
  510 PROCtext(27,1,"Shields")
  520 PROCtext(48,1,"Ammo")
  530 PROCtext(60,1,"Fuel")
  540 PROCtext(71,1,"Shields")
  550 PROCtext(14,2,"Player 1")
  560 PROCtext(58,2,"Player 2")
  570 PROCtext(15,3,"Games")
  580 PROCtext(59,3,"Games")
  590 FOR T%=0 TO &27FC STEP 4
  600 header%!T%=T%!(!screen):NEXT
  610 SYS "OS_Byte",112,1
  620 :
  630 SYS "OS_Module",11,code%,moduleend
-code%
  640 :
  650 VOICES 8
  660 FOR T%=1 TO 8
  670 VOICE T%,"GameVoice"
  680 NEXT
  690 VOICE 4,"Percussion-Noise"
  700 :
  710 REPEAT
  720 :
  730 !timeleft=0
  740 !deadflag=&FFFF:!gameover=&FF
  750 !starptr=!stardata
  760 CALL initexpand
  770 !messflag=&FF:!space=&FF
  780 VOICES 4
  790 !clock=0
  800 REPEAT
  810 CALLdraw:CALLdomusic
  820 UNTIL INKEY-99
  830 VOICES 8
  840 FOR T%=1 TO 3:SOUND T%,0,0,0:NEXT
  850 !space=0
  860 :
  870 !games1=0:!games2=0
  880 FOR T%=1 TO 32
  890 CALL swallow
  900 CALL draw
  910 NEXT
  920 !starptr=stars%:!messflag=0
  930 :
  940 REPEAT
  950 ang1%=90:ang2%=270
  960 x1%=100:x2%=1178
  970 y1%=RND(672)+112:y2%=RND(672)+112
  980 !x1=x1%:!x2=x2%:!y1=y1%:!y2=y2%
  990 !ang1=ang1%:!ang2=ang2%
 1000 !xvec1=0:!yvec1=0
 1010 !xvec2=0:!yvec2=0
 1020 !fuel1=maxfuel%:!fuel2=maxfuel%
 1030 !ammo1=maxammo%:!ammo2=maxammo%
 1040 !shield1=maxshi%:!shield2=maxshi%
 1050 dead%=0:!gameover=0:!deadflag=0
 1060 FOR T%=0 TO 31*20 STEP 20:bultab!(
T%+16)=0:NEXT
 1070 !scale1=4096:!scale2=4096
 1080 !hypflag1=0:!hypflag2=0
 1090 !timeleft=500/2
 1100 :
 1110 CALLdraw
 1120 !fuel1=0:!fuel2=0
 1130 !xvec1=0:!xvec2=0
 1140 !yvec1=0:!yvec2=0
 1150 !timeleft=200/2
 1160 CALLdraw
 1170 UNTIL !games1=10 OR !games2=10
 1180 !messflag=&FF
 1190 !starptr=!stardata
 1200 !ammo1=0:!ammo2=0
 1210 CALL initswallow
 1220 FOR T%=1 TO 32
 1230 IF T%=32 !deadflag=&FFFF
 1240 IF !scale1>0 !scale1-=128
 1250 IF !scale2>0 !scale2-=128
 1260 IF !scale1<0 !scale1=0
 1270 IF !scale2<0 !scale2=0
 1280 CALL swallow
 1290 CALL draw
 1300 NEXT
 1310 UNTIL FALSE
 1320 :
 1330 DEF PROCtext(B%,C%,$char%)
 1340 A%=char%
 1350 CALL writetext
 1360 ENDPROC
 1370 :
 1380 DEF FNr(R%):P%+=R%:=""
 1390 :
 1400 DEF FNrnd
 1410 [OPT PASS
 1420 MOVS R8,R8,LSL #1
 1430 EORCS R8,R8,R9
 1440 ]:=""
 1450 :
 1460 DEF FNrndnum(r%,b%)
 1470 [OPT PASS
 1480 FNrnd
 1490 MOVCC r%,#0
 1500 MOVCS r%,#1
 1510 ]
 1520 IF b%>1 THEN
 1530 FOR I%=2 TO b%
 1540 [OPT PASS
 1550 FNrnd:ORRCS r%,r%,#1<<(I%-1)
 1560 ]:NEXT
 1570 ENDIF
 1580 =""
 1590 :
 1600 DEF FNnextkey
 1610 [OPT PASS
 1620 LDRB R1,[R5],#1
 1630 MOV R2,#&FF
 1640 SWI "OS_Byte"
 1650 TEQ R1,#&FF
 1660 TEQEQ R2,#&FF
 1670 ]:=""
 1680 :
 1690 DEF FNplotpnt
 1700 [OPT PASS
 1710 CMP R0,#640
 1720 CMPLT R1,#256
 1730 BGE P%+32
 1740 LDRB R2,[R9,R0,LSR #1]
 1750 TST R0,#1
 1760 BICNE R2,R2,#&F0
 1770 ORRNE R2,R2,#&70
 1780 BICEQ R2,R2,#&0F
 1790 ORREQ R2,R2,#&07
 1800 STRB R2,[R9,R0,LSR #1]
 1810 ]:=""
 1820 :
 1830 DEF FNexp(f%)
 1840 [OPT PASS
 1850 STMFD R13!,{r0-r12,R14}
 1860 LDR R0,deadflag
 1870 ]
 1880 IF f%=1 THEN
 1890 [OPT PASS:TST R0,#&FF:ORREQ R0,R0,
#&FF:]
 1900 ELSE
 1910 [OPT PASS:TST R0,#&FF00:ORREQ R0,R
0,#&FF00:]
 1920 ENDIF
 1930 [OPT PASS
 1940 LDMNEFD R13!,{r0-r12,PC}^
 1950 STR R0,deadflag
 1960 LDR R1,gameover
 1970 CMP R1,#0
 1980 ]
 1990 IF f%=1 THEN
 2000 [OPT PASS:LDREQ R1,games2:ADDEQ R1
,R1,#1:STREQ R1,games2:]
 2010 ELSE
 2020 [OPT PASS:LDREQ R1,games1:ADDEQ R1
,R1,#1:STREQ R1,games1:]
 2030 ENDIF
 2040 [OPT PASS
 2050 ADR R12,bultab
 2060 LDR R10,sintabptr2
 2070 LDR R11,costabptr2
 2080 MOV R7,#0
 2090 MOV R6,#15
 2100 MOV R0,#200
 2110 ]
 2120 IF f%=1 THEN
 2130 [OPT PASS:ORR R0,R0,#1<<31:LDR R1,
ptr1:LDMIA R1,{r1,R2}:]
 2140 ELSE
 2150 [OPT PASS:ADD R12,R12,#20*16:LDR R
1,ptr2:LDMIA R1,{r1,R2}:]
 2160 ENDIF
 2170 [OPT PASS
 2180 .exploop1
 2190 LDR R3,[R10,R7,LSL #2]
 2200 LDR R4,[R11,R7,LSL #2]
 2210 LDR R8,seed2
 2220 LDR R9,mask2
 2230 FNrnd:MOVCC R5,#8:MOVCS R5,#4
 2240 FNrnd:ORRCS R5,R5,#8
 2250 FNrnd:ORRCS R5,R5,#16
 2260 STR R8,seed2
 2270 MUL R3,R5,R3
 2280 MUL R4,R5,R4
 2290 STMIA R12!,{r1-r4}
 2300 STR R0,[R12],#4
 2310 ADD R7,R7,#24
 2320 SUBS R6,R6,#1
 2330 BNE exploop1
 2340 MOV R0,#4
 2350 MOV R1,#&170
 2360 MOV R2,#0
 2370 MOV R3,#30
 2380 SWI "Sound_Control"
 2390 LDMFD R13!,{r0-r12,PC}^
 2400 ]:=""
 2410 :
 2420 DEF FNtestpnt
 2430 [OPT PASS
 2440 SUBS R5,R3,R0
 2450 RSBMI R5,R5,#0
 2460 MUL R6,R5,R5
 2470 SUBS R5,R4,R1
 2480 RSBMI R5,R5,#0
 2490 MLA R6,R5,R5,R6
 2500 MUL R5,R2,R2
 2510 CMP R6,R5
 2520 ]:=""
 2530 :
 2540 DEF FNsuntest(p%,r%,e%)
 2550 [OPT PASS
 2560 LDR R1,p%
 2570 LDMIA R1,{r1,R2}
 2580 LDR R5,r%
 2590 SUBS R0,R1,#640
 2600 RSBMI R0,R0,#0
 2610 MUL R3,R0,R0
 2620 SUBS R0,R2,#512
 2630 RSBMI R0,R0,#0
 2640 MLA R3,R0,R0,R3
 2650 ADD R0,R5,#(sunrad%/2)
 2660 MUL R4,R0,R0
 2670 CMP R3,R4
 2680 BLLE e%
 2690 ]:=""
 2700 :
 2710 DEF FNfire(a%,c%,b%,j%,x%,y%,t%)
 2720 [OPT PASS
 2730 SUB R1,R1,#1:STR R1,a%
 2740 MOV R0,#c%
 2750 MOV R1,#&7F
 2760 ADD R1,R1,#256
 2770 MOV R2,#&7000
 2780 MOV R3,#3
 2790 SWI "Sound_Control"
 2800 MOV R0,#10:STR R0,b%
 2810 LDR R0,j%
 2820 MOV R3,#40
 2830 LDR R5,x%
 2840 LDR R6,y%
 2850 MOV R7,#bullen%
 2860 ]:IF t% THEN
 2870 [OPT PASS:ORR R7,R7,#1<<31:]
 2880 ENDIF
 2890 [OPT PASS
 2900 B enterbul
 2910 ]:=""
 2920 :
 2930 DEF PROCassem
 2940 DIM code% &5000,header% &2800,star
blk% &640,char% &800
 2950 FOR PASS=0 TO 2 STEP 2
 2960 P%=code%:[OPT PASS
 2970 :
 2980 EQUD 0
 2990 EQUD init-code%
 3000 EQUD finish-code%
 3010 EQUD 0
 3020 EQUD modname-code%
 3030 EQUD help-code%
 3040 EQUD 0
 3050 :
 3060 .modname
 3070 EQUS "GameModule":EQUB 0
 3080 :
 3090 .help
 3100 EQUS "Game Module":EQUB 9
 3110 EQUS "1.00 ("+MID$(TIME$,5,11)+")"
 3120 EQUB 0
 3130 ALIGN
 3140 :
 3150 .voicenum EQUD 0
 3160 :
 3170 .init
 3180 LDR R0,voicenum
 3190 CMP R0,#0
 3200 MOVNE PC,R14
 3210 STMFD R13!,{r14}
 3220 ADR R0,voice
 3230 MOV R1,#0
 3240 SWI "XSound_InstallVoice"
 3250 STRVC R1,voicenum
 3260 LDMFD R13!,{pc}
 3270 :
 3280 .finish
 3290 LDR R1,voicenum
 3300 CMP R1,#0
 3310 MOVEQ PC,R14
 3320 STMFD R13!,{r14}
 3330 SWI "XSound_RemoveVoice"
 3340 MOVVC R1,#0
 3350 STRVC R1,voicenum
 3360 LDMFD R13!,{pc}
 3370 :
 3380 .voice
 3390 B Fill
 3400 B Fill
 3410 B GateOn
 3420 B GateOff
```

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```
3430 B Instantiate
3440 LDMFD R13!,{pc}
3450 LDMFD R13!,{pc}
3460 EQUD VoiceName-voice
3470 :
3480 .VoiceName
3490 EQUS "GameVoice"
3500 EQUB 0:ALIGN
3510 :
3520 .LogAmpPtr EQUD 0
3530 .LinLogPtr EQUD 0
3540 :
3550 .Instantiate
3560 STMFD R13!,{r0-r4}
3570 MOV R0,#0:MOV R1,#0
3580 MOV R2,#0:MOV R3,#0
3590 MOV R4,#0
3600 SWI "Sound_Configure"
3610 LDR R0,[R3,#12]
3620 STR R0,LogAmpPtr
3630 LDR R0,[R3,#8]
3640 STR R0,LinLogPtr
3650 LDMFD R13!,{r0-r4,PC}^
3660 :
3670 .GateOn
3680 MOV R0,#0
3690 STR R0,[R9,#8]
3700 ADR R0,table
3710 STR R0,[R9,#16]
3720 LDR R0,LogAmpPtr
3730 STR R0,[R9,#20]
3740 LDR R0,LinLogPtr
3750 STR R0,[R9,#24]
3760 LDR R0,[R9]
3770 AND R0,R0,#&7F
3780 STR R0,[R9,#28]
3790 :
3800 .Fill
3810 LDMIA R9,{r1-r8}
3820 LDRB R1,[R6,R8,LSL #1]
3830 MOV R1,R1,LSR #1
3840 RSB R1,R1,#127
3850 ADD R2,R2,R3
3860 MOV R3,#0
3870 .FillLoop
3880 ]:FOR T%=1 TO 4:[OPT PASS
3890 ADD R2,R2,R2,LSL #16
3900 LDRB R0,[R5,R2,LSR #22]
3910 LDRB R0,[R7,R0,LSL #5]
3920 SUBS R0,R0,R1,LSL #1
3930 MOVMI R0,#0
3940 STRB R0,[R12],R11
3950 ]:NEXT:[OPT PASS
3960 CMP R12,R10
3970 BLT FillLoop
3980 SUBS R4,R4,#1
3990 SUBMI R8,R8,#2
4000 STMIB R9,{r2-r8}
4010 CMP R8,#0
4020 MOVPL R0,#8
4030 MOVMI R0,#2
4040 LDMFD R13!,{pc}
4050 :
4060 .GateOff
4070 MOV R0,#0
4080 .FlushLoop
4090 STRB R0,[R12],R11
4100 STRB R0,[R12],R11
4110 STRB R0,[R12],R11
4120 STRB R0,[R12],R11
4130 CMP R12,R10
4140 BLT FlushLoop
4150 MOV R0,#1
4160 LDMFD R13!,{pc}
4170 :
4180 .table
4190 FNr(1024)
4200 :
4210 .moduleend
4220 :
4230 .fire1
4240 FNfire(ammo1,5,buldel1,ang1,x1,y1,0)
4250 .fire2
4260 FNfire(ammo2,6,buldel2,ang2,x2,y2,-1)
4270 :
4280 .starptr EQUD stars%
4290 .suntabptr EQUD 0
4300 .suntabraw EQUD suntab%
4310 .sunoff EQUD 0
4320 .sintabptr EQUD sintab
4330 .costabptr EQUD costab
4340 .ship1ptr EQUD ship1%
4350 .ship2ptr EQUD ship2%
4360 .shipdataptr EQUD shipdata%
4370 .np EQUD numpts%
4380 .x1 EQUD 0
4390 .y1 EQUD 0
4400 .ang1 EQUD 0
4410 .scale1 EQUD 4096
4420 .hypflag1 EQUD 0
4430 .hypcount1 EQUD 0
4440 .hypstep1 EQUD 0
4450 .xvec1 EQUD 0
4460 .thrustflag1 EQUD 0
4470 .yvec1 EQUD 0
4480 .fuel1 EQUD maxfuel%
4490 .x2 EQUD 0
4500 .y2 EQUD 0
4510 .ang2 EQUD 0
4520 .scale2 EQUD 4096
4530 .hypflag2 EQUD 0
4540 .hypcount2 EQUD 0
4550 .hypstep2 EQUD 0
4560 .xvec2 EQUD 0
4570 .thrustflag2 EQUD 0
4580 .yvec2 EQUD 0
4590 .fuel2 EQUD maxfuel%
4600 .bank EQUD 2
4610 .vdublock EQUD 148:EQUD -1
4620 .screen EQUD 0
4630 .seed EQUD TIME
4640 .mask EQUD &1D872B41
4650 .ammo1 EQUD 0
4660 .ammo2 EQUD 0
4670 .shield1 EQUD 0
4680 .shield2 EQUD 0
4690 .buldel1 EQUD 0
4700 .buldel2 EQUD 0
4710 .messflag EQUD 0
4720 :
4730 .draw
4740 STMFD R13!,{r14}
4750 LDR R1,bank
4760 MOV R0,#112
4770 SWI "OS_Byte"
4780 ADR R0,vdublock
4790 ADR R1,screen
4800 SWI "OS_ReadVduVariables"
4810 LDR R12,screen
4820 STR R12,screen2
4830 LDR R0,deadflag
4840 CMP R0,#0
4850 MOVNE R0,#4
4860 MOVEQ R0,#0
4870 MOVNE R1,#&FF
4880 STRNE R1,gameover
4890 BL blankscr
4900 \ check for message
4910 LDR R3,messflag
4920 TEQ R3,#0
4930 BLNE title
4940 \ do random
4950 LDR R8,seed
4960 LDR R9,mask
4970 BL rand1
4980 STR R0,sunoff
4990 STR R8,seed
5000 LDR R3,suntabraw
5010 BL rand2
5020 STR R0,rndx
5030 STR R1,rndy
5040 STR R2,suntabptr
5050 \ check keys
5060 ADR R12,x1
5070 MOV R1,#0
5080 BL checkkeys
5090 ADR R12,x2
5100 MOV R1,#8
5110 BL checkkeys
5120 LDR R0,deadflag
5130 MOV R1,#0
5140 TST R0,#&FF
5150 STRNE R1,thrustflag1
5160 TST R0,#&FF00
5170 STRNE R1,thrustflag2
5180 \ update ship 1 parameters
5190 ADR R12,x1
5200 LDMIA R12,{r0-r10}
5210 LDR R11,buldel1
5220 TEQ R11,#0
5230 BICNE R8,R8,#&FF0000
5240 SUBNE R11,R11,#1
5250 STRNE R11,buldel1
5260 BL updateparams
5270 LDR R10,fuel1
5280 TEQ R10,#0
5290 TSTNE R8,#&FF
5300 SUBNE R10,R10,#1
5310 STMIA R12!,{r0-r10}
5320 \ update ship 2 parameters
5330 LDMIA R12,{r0-r10}
5340 LDR R11,buldel2
5350 TEQ R11,#0
5360 BICNE R8,R8,#&FF0000
5370 SUBNE R11,R11,#1
5380 STRNE R11,buldel2
5390 BL updateparams
5400 LDR R10,fuel2
5410 TEQ R10,#0
5420 TSTNE R8,#&FF
5430 SUBNE R10,R10,#1
5440 STMIA R12!,{r0-r10}
5450 LDR R0,scale1
5460 LDR R1,scale2
5470 BL scaleradius
5480 \ check fire 1
5490 LDR R0,thrustflag1
5500 LDR R1,ammo1
5510 TST R0,#&FF0000
5520 TEQNE R1,#0
5530 BICEQ R0,R0,#&FF0000
5540 STREQ R0,thrustflag1
5550 BLNE fire1
5560 \ check fire 2
5570 LDR R0,thrustflag2
5580 LDR R1,ammo2
5590 TST R0,#&FF0000
5600 TEQNE R1,#0
5610 BICEQ R0,R0,#&FF0000
5620 STREQ R0,thrustflag2
5630 BLNE fire2
5640 \ rotate ship 1
5650 LDR R12,shipdataptr
5660 LDR R11,ship1ptr
5670 LDR R10,ang1
5680 LDR R9,np
5690 LDR R6,scale1
5700 BL rot
5710 \ rotate ship 2
5720 LDR R12,shipdataptr
5730 LDR R11,ship2ptr
5740 LDR R10,ang2
5750 LDR R9,np
5760 LDR R6,scale2
5770 BL rot
5780 \ draw sun
5790 LDR R7,sintabptr
5800 LDR R8,costabptr
5810 LDR R11,suntabptr
5820 LDR R0,sunoff
5830 ADD R7,R7,R0,LSL #2
5840 ADD R8,R8,R0,LSL #2
5850 MOV R9,#18
5860 .sunloop
5870 MOV R1,#640
5880 MOV R2,#512
5890 LDR R10,[R11],#4
5900 LDR R5,[R7],#80
5910 LDR R6,[R8],#80
5920 MUL R3,R5,R10
5930 MUL R4,R6,R10
5940 ADD R3,R1,R3,ASR #12
5950 ADD R4,R2,R4,ASR #12
5960 MOV R0,#7
5970 BL drawline
5980 SUBS R9,R9,#1
5990 BNE sunloop
6000 \ draw stars
6010 LDR R12,starptr
6020 MOV R11,#100
6030 LDR R10,screen
6040 MOV R0,#320
6050 .starloop
6060 LDMIA R12!,{r1,R2}
6070 MOV R1,R1,LSR #5
6080 MOV R2,R2,LSR #5
6090 TST R1,#1
6100 MOVNE R3,#&80:MOVNE R4,#&70
6110 MOVEQ R3,#&08:MOVEQ R4,#&07
6120 MLA R2,R0,R2,R10
6130 ADD R2,R2,R1,LSR #1
6140 LDRB R1,[R2]
6150 BIC R1,R1,R3
6160 ORR R1,R1,R4
6170 STRB R1,[R2]
6180 SUBS R11,R11,#1
6190 BNE starloop
6200 BL checkships
6210 \ draw ship 1
6220 LDR R12,ship1ptr
6230 LDR R9,x1
6240 LDR R10,y1
6250 LDR R8,np
6260 LDR R0,deadflag
6270 TST R0,#&FF
6280 MOVEQ R0,#1
6290 BLEQ drawship
6300 \ draw ship 2
6310 LDR R12,ship2ptr
6320 LDR R9,x2
6330 LDR R10,y2
6340 LDR R8,np
6350 LDR R0,deadflag
6360 TST R0,#&FF00
6370 MOVEQ R0,#2
6380 BLEQ drawship
6390 \ status 1
6400 ADR R12,cotab
6410 LDR R9,ammo1
6420 LDR R10,fuel1
6430 LDR R11,shield1
6440 BL status
6450 \ status 2
6460 LDR R9,ammo2
6470 LDR R10,fuel2
6480 LDR R11,shield2
6490 BL status
6500 BL handlebullets
6510 LDR R7,thrustflag1
6520 LDR R8,thrustflag2
6530 LDR R9,shiflag
6540 BL updatesound
6550 \ display
6560 MOV R0,#19
6570 SWI "OS_Byte"
6580 LDR R1,bank
6590 MOV R0,#113
6600 EOR R2,R1,#3
6610 STR R2,bank
6620 SWI "OS_Byte"
6630 \ exit
6640 LDMFD R13!,{r14}
6650 LDR R0,gameover
6660 LDR R1,timeleft
6670 CMP R0,#0:CMPNE R1,#0
6680 SUBNE R1,R1,#1
6690 STR R1,timeleft
6700 CMP R1,#0
6710 BNE draw
6720 MOVS PC,R14
6730 :
6740 .cotab FNr(12)
6750 .timeleft EQUD 0
6760 :
6770 .rot
6780 LDR R7,sintabptr
6790 LDR R8,costabptr
6800 LDR R7,[R7,R10,LSL #2]
6810 LDR R8,[R8,R10,LSL #2]
6820 RSB R7,R7,#0
6830 .rotloop
6840 LDMIA R12!,{r0,R1}
6850 MUL R2,R0,R7
6860 MUL R4,R1,R8
6870 ADD R4,R4,R2
6880 MUL R2,R0,R8
6890 MUL R3,R1,R7
6900 SUB R3,R2,R3
6910 MOV R3,R3,ASR #12
6920 MOV R4,R4,ASR #12
6930 MUL R3,R6,R3
6940 MUL R4,R6,R4
6950 MOV R3,R3,ASR #12
6960 MOV R4,R4,ASR #12
6970 STMIA R11!,{r3,R4}
6980 SUBS R9,R9,#1
6990 BNE rotloop
7000 MOVS PC,R14
7010 :
7020 .vnum EQUD 8
7030 :
7040 .updateparams
7050 LDR R11,vnum
7060 EOR R11,R11,#15
7070 STR R11,vnum
7080 CMP R2,#360:SUBGE R2,R2,#360
7090 CMP R2,#0:ADDLT R2,R2,#360
7100 CMP R4,#0:BEQ nohyp
7110 SUBS R5,R5,#1
7120 BEQ changestep
7130 ADD R3,R3,R6
7140 STMFD R13!,{r0-r2}
7150 MOV R0,R11
7160 MOV R1,#8
7170 MOV R2,R6,ASR #4
7180 RSB R2,R2,#0
7190 SWI "Sound_WriteControlBlock"
7200 LDMFD R13!,{r0-r2}
7210 B exithyp
7220 .changestep
7230 MOV R5,#hyperstep%
7240 SUBS R4,R4,#1
7250 RSBNE R6,R6,#0
7260 LDRNE R0,rndx
7270 LDRNE R1,rndy
7280 B exithyp
7290 .nohyp
7300 TST R8,#&FF00
7310 BEQ exithyp
7320 STMFD R13!,{r0-r3}
7330 MOV R0,R11
7340 MOV R1,#&7F
7350 ADD R1,R1,#256
7360 SUB R2,R11,#7
7370 MOV R2,R2,LSL #2
7380 MOV R3,#(hyperstep%*4/5)
7390 SWI "Sound_Control"
7400 LDMFD R13!,{r0-r3}
7410 MOV R4,#2
7420 LDR R6,hyperstep
7430 MOV R5,#hyperstep%
7440 .exithyp
7450 TEQ R10,#0:BICEQ R8,R8,#&FF
7460 TST R8,#&FF
7470 MOVEQ R11,#0:MOVNE R11,#2
7480 LDR R10,sintabptr
7490 LDR R10,[R10,R2,LSL #2]
7500 MUL R10,R11,R10
7510 SUB R7,R7,R7,ASR #airres%
7520 ADD R7,R7,R10
7530 :
7540 LDR R10,costabptr
7550 LDR R10,[R10,R2,LSL #2]
7560 MUL R10,R11,R10
7570 SUB R9,R9,R9,ASR #airres%
7580 ADD R9,R9,R10
7590 :
7600 TST R7,#1<<31
7610 MOVEQ R10,R7
7620 RSBNE R10,R7,#0
7630 CMP R10,#1<<12
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DEATH BEFORE DISHONOUR

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7640 MOVLT R10,#0
7650 TST R9,#1<<31
7660 MOVEQ R11,R9
7670 RSBNE R11,R9,#0
7680 CMP R11,#1<<12
7690 MOVLT R11,#0
7700 CMP R10,#0:CMPEQ R11,#0
7710 MOVEQ R7,#0:MOVEQ R9,#0
7720 :
7730 ADD R0,R0,R7,ASR #12
7740 ADD R1,R1,R9,ASR #12
7750 :
7760 CMP R0,#(&500+xgap%)
7770 SUBGE R0,R0,#(&500+xgap%*2)
7780 CMN R0,#xgap%
7790 ADDLT R0,R0,#(&500+xgap%*2)
7800 CMN R1,#ygap%
7810 ADDLT R1,R1,#(&400+ygap%*2)
7820 CMP R1,#(&400+ygap%)
7830 SUBGE R1,R1,#(&400+ygap%*2)
7840 MOVS PC,R14
7850 :
7860 .gameover EQUD 0
7870 .hyperstep EQUD -1/hyperstep%*4096
7880 .rndx EQUD 0:.rndy EQUD 0
7890 .deadflag EQUD 0
7900 :
7910 .drawline
7920 STMFD R13!,{r1-r11,R14}
7930 MOV R1,R1,ASR #1
7940 MOV R3,R3,ASR #1
7950 MOV R2,R2,ASR #2
7960 MOV R4,R4,ASR #2
7970 LDR R10,screen
7980 RSB R2,R2,#255
7990 RSB R4,R4,#255
8000 SUBS R3,R3,R1
8010 RSBMI R3,R3,#0
8020 MOVGT R8,#1
8030 MOVEQ R8,#0
8040 MVNLT R8,#0
8050 SUBS R4,R4,R2
8060 RSBMI R4,R4,#0
8070 MOVGT R9,#1:MOV R14,#320
8080 MOVEQ R9,#0:MOVEQ R14,#0
8090 MVNLT R9,#0:RSBLT R14,R14,#0
8100 MOV R7,#320
8110 MLA R10,R7,R2,R10
8120 CMP R4,R3
8130 MOVGT R6,R3
8140 MOVGT R3,R4
8150 MOVGT R4,R6
8160 MOVGT R5,#1
8170 MOVLE R5,#0
8180 RSB R6,R3,R4,LSL #1
8190 TEQ R3,#0:MOVEQ R3,#1
8200 TEQ R4,#0:MOVEQ R4,#1
8210 MOV R7,R3
8220 :
8230 .lineloop
8240 CMP R1,#0
8250 CMPGE R2,#0
8260 BLT noplot
8270 CMP R1,#640
8280 CMPLT R2,#256
8290 BGE noplot
8300 :
8310 TST R1,#1
8320 LDRB R11,[R10,R1,LSR #1]
8330 BICNE R11,R11,#&F0
8340 BICEQ R11,R11,#&0F
8350 ORRNE R11,R11,R0,LSL #4
8360 ORREQ R11,R11,R0
8370 STRB R11,[R10,R1,LSR #1]
8380 :
8390 .noplot
8400 CMP R6,#0
8410 BMI endwhile
8420 .while
8430 CMP R5,#1
8440 ADDEQ R1,R1,R8
8450 ADDNE R2,R2,R9:ADDNE R10,R10,R14
8460 SUBS R6,R6,R3,LSL #1
8470 BPL while
8480 .endwhile
8490 CMP R5,#0
8500 ADDEQ R1,R1,R8
8510 ADDNE R2,R2,R9:ADDNE R10,R10,R14
8520 ADD R6,R6,R4,LSL #1
8530 SUBS R7,R7,#1
8540 BNE lineloop
8550 LDMFD R13!,{r1-r11,PC}^
8560 :
8570 .numbuff EQUD &D2020
8580 :
8590 .checkspeeds
8600 STMFD R13!,{r14}
8610 LDR R0,deadflag
8620 TEQ R0,#0
8630 LDMNEFD R13!,{pc}^
8640 LDR R0,xvec1
8650 LDR R1,yvec1
8660 MOV R0,R0,ASR #6
8670 MOV R1,R1,ASR #6
8680 MUL R2,R0,R0
8690 MLA R0,R1,R1,R2
8700 LDR R1,xvec2
8710 LDR R2,yvec2
8720 MOV R1,R1,ASR #6
8730 MOV R2,R2,ASR #6
8740 MUL R3,R1,R1
8750 MLA R1,R2,R2,R3
8760 LDR R2,square
8770 CMP R0,R2:MOVLT R0,#0
8780 CMP R1,R2:MOVLT R1,#0
8790 CMP R0,R1
8800 BLLE explode1
8810 BLGE explode2
8820 LDMFD R13!,{pc}^
8830 :
8840 .square EQUD (4096)^2
8850 :
8860 .status
8870 STMFD R13!,{r14}
8880 LDR R0,deadflag
8890 CMP R0,#0
8900 BNE gamestatus
8910 LDRB R1,[R12],#1
8920 LDRB R2,[R12],#1
8930 MOV R3,R9
8940 BL writenum
8950 LDRB R1,[R12],#1
8960 LDRB R2,[R12],#1
8970 MOV R3,R10,LSR #4
8980 BL writenum
8990 LDRB R1,[R12],#1
9000 LDRB R2,[R12],#1
9010 MOV R3,R11
9020 BL writenum
9030 LDMFD R13!,{pc}^
9040 :
9050 .writenum
9060 MOV R0,#0
9070 CMP R3,#10
9080 .numloop
9090 ADDGE R0,R0,#1
9100 SUBGE R3,R3,#10
9110 CMPGE R3,#10
9120 BGE numloop
9130 CMP R0,#0
9140 MOVEQ R0,#32
9150 ADDNE R0,R0,#48
9160 ADD R3,R3,#48
9170 STRB R0,numbuff
9180 STRB R3,numbuff+1
9190 ADR R0,numbuff
9200 MOV R3,#255
9210 :
9220 .writetext
9230 STMFD R13!,{r10-r12,R14}
9240 LDR R11,charptr
9250 LDR R10,screen
9260 MOV R8,#2560
9270 MLA R10,R2,R8,R10
9280 ADD R10,R10,R1,LSL #2
9290 B writetext2
9300 :
9310 .checkkeys
9320 ADR R5,keys1
9330 ADD R5,R5,R1
9340 LDR R6,[R12,#8]
9350 MOV R0,#129
9360 FNnextkey
9370 SUBEQ R6,R6,#turn%
9380 FNnextkey
9390 ADDEQ R6,R6,#turn%
9400 FNnextkey
9410 MOVNE R7,#0
9420 MOVEQ R7,#&FF
9430 FNnextkey
9440 ORREQ R7,R7,#&FF00
9450 FNnextkey
9460 ORREQ R7,R7,#&FF0000
9470 STR R6,[R12,#8]
9480 STR R7,[R12,#32]
9490 MOVS PC,R14
9500 :
9510 .screen2 EQUD 0
9520 .charptr EQUD char%
9530 .keys1 FNr(5):ALIGN
9540 .keys2 FNr(5):ALIGN
9550 .sintab FNr(90*4)
9560 .costab FNr(360*4)
9570 .stack EQUD 0
9580 :
9590 .handlebullets
9600 STMFD R13!,{r14}
9610 ADR R12,bultab
9620 MOV R11,#32
9630 LDR R10,screen2
9640 LDR R0,shiflag
9650 TST R0,#4
9660 BICNE R0,R0,#4
9670 BICEQ R0,R0,#1
9680 TST R0,#8
9690 BICNE R0,R0,#8
9700 BICEQ R0,R0,#2
9710 STR R0,shiflag
9720 .updatebul
9730 LDMIA R12,{r0-r4}
9740 BIC R5,R4,#1<<31
9750 CMP R5,#0
9760 ADDEQ R12,R12,#20
9770 BEQ nextbul
9780 ADD R0,R0,R2,ASR #12
9790 ADD R1,R1,R3,ASR #12
9800 CMP R0,#(&500+xgap%)
9810 SUBGE R0,R0,#(&500+xgap%*2)
9820 CMN R0,#xgap%
9830 ADDLT R0,R0,#(&500+xgap%*2)
9840 CMN R1,#ygap%
9850 ADDLT R1,R1,#(&400+ygap%*2)
9860 CMP R1,#(&400+ygap%)
9870 SUBGE R1,R1,#(&400+ygap%*2)
9880 SUB R5,R5,#1
9890 AND R4,R4,#1<<31
9900 ORR R4,R5,R4
9910 STMIA R12!,{r0-r4}
9920 :
9930 .checkbullet
9940 TST R4,#1<<31
9950 BEQ checkship2
9960 .checkship1
9970 LDR R2,deadflag
9980 TST R2,#&FF
9990 BNE drawbul
10000 LDR R3,ptr1
10010 LDMIA R3,{r3,R4}
10020 LDR R2,rad1
10030 FNtestpnt
10040 BGT drawbul
10050 LDR R2,shield1
10060 CMP R2,#0
10070 SUBNE R2,R2,#1
10080 STRNE R2,shield1
10090 LDRNE R2,shiflag
10100 ORRNE R2,R2,#5
10110 STRNE R2,shiflag
10120 BLEQ explode1
10130 MOV R2,#0
10140 STR R2,[R12,#-4]
10150 B drawbul
10160 .checkship2
10170 LDR R2,deadflag
10180 TST R2,#&FF00
10190 BNE drawbul
10200 LDR R3,ptr2
10210 LDMIA R3,{r3,R4}
10220 LDR R2,rad2
10230 FNtestpnt
10240 BGT drawbul
10250 LDR R2,shield2
10260 CMP R2,#0
10270 SUBNE R2,R2,#1
10280 STRNE R2,shield2
10290 LDRNE R2,shiflag
10300 ORRNE R2,R2,#10
10310 STRNE R2,shiflag
10320 BLEQ explode2
10330 MOV R2,#0
10340 STR R2,[R12,#-4]
10350 :
10360 .drawbul
10370 CMP R0,#0
10380 CMPGE R1,#0
10390 BLT nextbul
10400 CMP R0,#1280
10410 CMPLT R1,#1024
10420 BGE nextbul
10430 MOV R0,R0,LSR #1
10440 MOV R1,R1,LSR #2
10450 RSB R1,R1,#255
10460 MOV R2,#320
10470 MLA R9,R2,R1,R10
10480 FNplotpnt
10490 ADD R0,R0,#1
10500 FNplotpnt
10510 SUB R0,R0,#1
10520 ADD R9,R9,#320
10530 ADD R1,R1,#1
10540 FNplotpnt
10550 ADD R0,R0,#1
10560 FNplotpnt
10570 :
10580 .nextbul
10590 SUBS R11,R11,#1
10600 BNE updatebul
10610 LDMFD R13!,{pc}^
10620 :
10630 .shiflag EQUD 0
10640 :
10650 .rad1 EQUD 0
10660 .rad2 EQUD 0
10670 .rad3 EQUD 0
10680 :
10690 .scaleradius
10700 LDR R3,rad3
10710 MUL R2,R0,R3
10720 MUL R3,R1,R3
10730 MOV R2,R2,LSR #12
10740 MOV R3,R3,LSR #12
10750 STR R2,rad1
10760 STR R3,rad2
10770 MOVS PC,R14
10780 :
10790 .bultab FNr(32*20)
10800 :
10810 .explode1
10820 FNexp(1)
10830 :
10840 .explode2
10850 FNexp(2)
10860 :
10870 .enterbul
10880 LDR R1,sintabptr2
10890 LDR R1,[R1,R0,LSL #2]
10900 LDR R2,costabptr2
10910 LDR R2,[R2,R0,LSL #2]
10920 MUL R1,R3,R1
10930 MUL R2,R3,R2
10940 ADR R3,bultab
10950 MOV R0,#32
10960 .bulloop
10970 LDR R4,[R3,#16]
10980 BIC R4,R4,#1<<31
10990 CMP R4,#0
11000 BEQ foundentry
11010 ADD R3,R3,#20
11020 SUBS R0,R0,#1
11030 BNE bulloop
11040 MOVS PC,R14
11050 :
11060 .drawship
11070 \ draw a ship
11080 STMFD R13!,{r14}
11090 MOV R11,R12
11100 LDMIA R11!,{r1,R2}
11110 ADD R1,R1,R9
11120 ADD R2,R2,R10
11130 LDR R3,shiflag
11140 TST R3,R0
11150 MOVEQ R0,#7
11160 MOVNE R0,#1
11170 SUB R8,R8,#1
11180 .drawloop
11190 LDMIA R11!,{r3,R4}
11200 ADD R3,R3,R9
11210 ADD R4,R4,R10
11220 BL drawline
11230 MOV R1,R3:MOV R2,R4
11240 SUBS R8,R8,#1
11250 BNE drawloop
11260 LDMIA R12,{r3,R4}
11270 ADD R3,R3,R9
11280 ADD R4,R4,R10
11290 BL drawline
11300 LDMFD R13!,{pc}^
11310 :
11320 .seed2 EQUD TIME
11330 .mask2 EQUD &1D872B41
11340 .sintabptr2 EQUD sintab
11350 .costabptr2 EQUD costab
11360 .ptr1 EQUD x1
11370 .ptr2 EQUD x2
11380 :
11390 .checkships
11400 STMFD R13!,{r14}
11410 LDR R1,ptr1
11420 LDMIA R1,{r1,R2}
11430 LDR R3,ptr2
11440 LDMIA R3,{r3,R4}
11450 LDR R5,rad1
11460 LDR R6,rad2
11470 SUBS R0,R3,R1
11480 RSBMI R0,R0,#0
11490 MUL R7,R0,R0
11500 SUBS R0,R4,R2
11510 RSBMI R0,R0,#0
11520 MLA R8,R0,R0,R7
11530 ADD R0,R5,R6
11540 MUL R7,R0,R0
11550 CMP R8,R7
11560 BLLE checkspeeds
11570 .checksun
11580 FNsuntest(ptr1,rad1,explode1)
11590 FNsuntest(ptr2,rad2,explode2)
11600 LDMFD R13!,{pc}^
11610 :
11620 .blankscr
11630 STMFD R13!,{r14}
11640 STR R13,stack
11650 ADR R13,headerptr
11660 ADD R13,R13,R0
11670 LDR R13,[R13]
11680 MOV R14,#16
11690 .copyloop
11700 :
11710 ]
11720 FOR T%=1 TO 6
11730 [OPT PASS
11740 LDMIA R13!,{r0-r11}
11750 STMIA R12!,{r0-r11}
11760 ]
11770 NEXT
11780 :
11790 [OPT PASS
11800 LDMIA R13!,{r0-r7}
11810 STMIA R12!,{r0-r7}
11820 SUBS R14,R14,#1
11830 BNE copyloop
11840 :
11850 LDR R13,stack
11860 ADR R0,emptyblock
11870 LDMIA R0,{r0-r11}
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11880 MOV R14,#240
11890 .blankloop
11900 :
11910 ]
11920 FOR T%=1 TO 6
11930 [OPT PASS
11940 STMIA R12!,{rØ-r11}
11950 ]
11960 NEXT
11970 :
11980 [OPT PASS
11990 STMIA R12!,{rØ-r7}
12000 SUBS R14,R14,#1
12010 BNE blankloop
12020 LDMFD R13!,{pc}^
12030 :
12040 .emptyblock FNr(12*4)
12050 .headerptr EQUD header%:EQUD header%+&1400
12060 :
12070 .games1 EQUD Ø
12080 .games2 EQUD Ø
12090 :
12100 .gamestatus
12110 LDRB RØ,[R12],#6
12120 CMP RØ,#42
12130 MOVLT R1,#15
12140 MOVGE R1,#59
12150 MOV R2,#2
12160 LDRLT R3,games1
12170 LDRGE R3,games2
12180 LDMFD R13!,{r14}
12190 B writenum
12200 :
12210 .foundentry
12220 STR R7,[R3,#16]
12230 STR R1,[R3,#8]
12240 STR R2,[R3,#12]
12250 STR R5,[R3]
12260 STR R6,[R3,#4]
12270 MOVS PC,R14
12280 :
12290 .starptr2 EQUD stars%
12300 .starvec EQUD starblk%
12310 .stardata EQUD starblk%+&320
12320 :
12330 .initswallow
12340 LDR R1Ø,starvec
12350 LDR R11,starptr2
12360 LDR R12,stardata
12370 MOV R9,#1ØØ
12380 .swallowloop1
12390 LDMIA R11!,{rØ,R1}
12400 STMIA R12!,{rØ,R1}
12410 MOV R2,RØ,LSR #5
12420 MOV R3,R1,LSR #5
12430 RSB R2,R2,#32Ø
12440 RSB R3,R3,#128
12450 STMIA R1Ø!,{r2,R3}
12460 SUBS R9,R9,#1
12470 BNE swallowloop1
12480 MOVS PC,R14
12490 :
12500 .initexpand
12510 LDR R1Ø,starvec
12520 LDR R11,starptr2
12530 LDR R12,stardata
12540 MOV R9,#1ØØ
12550 MOV R4,#32Ø<<5
12560 MOV R5,#128<<5
12570 .swallowloop3
12580 LDMIA R11!,{rØ,R1}
12590 STMIA R12!,{r4,R5}
12600 MOV R2,RØ,LSR #5
12610 MOV R3,R1,LSR #5
12620 SUB R2,R2,#32Ø
12630 SUB R3,R3,#128
12640 STMIA R1Ø!,{r2,R3}
12650 SUBS R9,R9,#1
12660 BNE swallowloop3
12670 MOVS PC,R14
12680 :
12690 .swallow
12700 LDR R12,stardata
12710 LDR R1Ø,starvec
12720 MOV R9,#1ØØ
12730 .swallowloop2
12740 LDMIA R12,{rØ,R1}
12750 LDMIA R1Ø!,{r2,R3}
12760 ADD RØ,RØ,R2
12770 ADD R1,R1,R3
12780 STMIA R12!,{rØ,R1}
12790 SUBS R9,R9,#1
12800 BNE swallowloop2
12810 MOVS PC,R14
12820 :
12830 .writechar
12840 ADD R3,R11,R3,LSL #3
12850 MOV R9,R1Ø
12860 MOV R7,#8
12870 .charloopa
12880 LDR R8,[R9]
12890 LDRB R2,[R3],#1
12900 MOV R1,#128
12910 MOV R4,#8
12920 MOV R5,#7 \ colour
12930 MOV R6,#15
12940 .charloopb
12950 TST R2,R1
12960 BICNE R8,R8,R6
12970 ORRNE R8,R8,R5
12980 MOV R1,R1,LSR #1
12990 MOV R5,R5,LSL #4
13000 MOV R6,R6,LSL #4
13010 SUBS R4,R4,#1
13020 BNE charloopb
13030 STR R8,[R9],#32Ø
13040 SUBS R7,R7,#1
13050 BNE charloopa
13060 MOVS PC,R14
13070 :
13080 .writechar2
13090 ADD R3,R11,R3,LSL #3
13100 MOV R9,R1Ø
13110 MOV R7,#8
13120 .charloop1
13130 LDRB R2,[R3],#1
13140 MOV R1,#128
13150 MOV R4,#4
13160 MOV R5,#7 \ colour
13170 MOV R6,#15
13180 LDR R8,[R9]
13190 LDR R12,[R9,#32Ø]
13200 .charloop2
13210 TST R2,R1
13220 BICNE R8,R8,R6
13230 ORRNE R8,R8,R5
13240 BICNE R12,R12,R6
13250 ORRNE R12,R12,R5
13260 BICNE R8,R8,R6,LSL #4
13270 ORRNE R8,R8,R5,LSL #4
13280 BICNE R12,R12,R6,LSL #4
13290 ORRNE R12,R12,R5,LSL #4
13300 MOV R1,R1,LSR #1
13310 MOV R5,R5,LSL #8
13320 MOV R6,R6,LSL #8
13330 SUBS R4,R4,#1
13340 BNE charloop2
13350 STR R8,[R9]
13360 STR R12,[R9,#32Ø]
13370 LDR R8,[R9,#4]
13380 LDR R12,[R9,#324]
13390 MOV R4,#4
13400 MOV R5,#7 \ colour
13410 MOV R6,#15
13420 .charloop3
13430 TST R2,R1
13440 BICNE R8,R8,R6
13450 ORRNE R8,R8,R5
13460 BICNE R12,R12,R6
13470 ORRNE R12,R12,R5
13480 BICNE R8,R8,R6,LSL #4
13490 ORRNE R8,R8,R5,LSL #4
13500 BICNE R12,R12,R6,LSL #4
13510 ORRNE R12,R12,R5,LSL #4
13520 MOV R1,R1,LSR #1
13530 MOV R5,R5,LSL #8
13540 MOV R6,R6,LSL #8
13550 SUBS R4,R4,#1
13560 BNE charloop3
13570 STR R8,[R9,#4]
13580 STR R12,[R9,#324]
13590 ADD R9,R9,#64Ø
13600 SUBS R7,R7,#1
13610 BNE charloop1
13620 MOVS PC,R14
13630 :
13640 .writetext2
13650 STR R3,textflag
13660 .writeloop
13670 LDRB R3,[RØ],#1
13680 CMP R3,#13
13690 LDMEQFD R13!,{r1Ø-r12,PC}^
13700 CMP R3,#32
13710 BLEQ nextchar
13720 LDR R12,textflag
13730 TEQ R12,#Ø
13740 BLNE writechar2
13750 BLEQ writechar
13760 .nextchar
13770 LDR R12,textflag
13780 TEQ R12,#Ø
13790 ADDEQ R1Ø,R1Ø,#4
13800 ADDNE R1Ø,R1Ø,#8
13810 B writeloop
13820 :
13830 .textflag EQUD Ø
13840 :
13850 .mess1 EQUS "Death Before Dishonour":EQUB 13:ALIGN
13860 .mess2 EQUS "Press Space Bar":EQUB 13:ALIGN
13870 .mess3 EQUS "By D Radford":EQUB 13:ALIGN
13880 .space EQUD Ø
13890 :
13900 .title
13910 STMFD R13!,{r14}
13920 ADR RØ,mess1
13930 MOV R1,#18
13940 MOV R2,#8
13950 MOV R3,#255
13960 BL writetext
13970 ADR RØ,mess3
13980 MOV R1,#34
13990 MOV R2,#3Ø
14000 MOV R3,#Ø
14010 BL writetext
14020 LDR RØ,space
14030 TEQ RØ,#Ø
14040 LDMEQFD R13!,{pc}^
14050 ADR RØ,mess2
14060 MOV R1,#25
14070 MOV R2,#22
14080 MOV R3,#255
14090 BL writetext
14100 LDMFD R13!,{pc}
14110 :
14120 .updatesound
14130 MOV RØ,#5
14140 MOV R1,#8
14150 MVN R2,#255
14160 SWI "Sound_WriteControlBlock"
14170 MOV RØ,#6
14180 MVN R2,#255
14190 SWI "Sound_WriteControlBlock"
14200 FNsoundcontrol(7,&FF,1,Ø,1)
14210 FNsoundcontrol(8,&FF,2,1Ø,1)
14220 FNsoundcontrol(9,3,3,&3ØØØ,5)
14230 MOVS PC,R14
14240 :
14250 .rand1
14260 FNrndnum(Ø,4)
14270 FNrnd:ADDCS RØ,RØ,#1
14280 FNrndnum(1,2)
14290 ADD RØ,RØ,R1
14300 MOVS PC,R14
14310 :
14320 .rand2
14330 FNrndnum(1,1Ø)
14340 FNrndnum(Ø,1Ø)
14350 FNrndnum(2,8)
14360 ADD RØ,RØ,R2
14370 .sunrange
14380 FNrndnum(2,8)
14390 CMP R2,#238
14400 BCS sunrange
14410 ADD R2,R3,R2,LSL #2
14420 MOVS PC,R14
14430 :
14440 ]NEXT
14450 :
14460 FOR T%=Ø TO 45Ø*4 STEP 4
14470 sintab!T%=SINRAD(T%/4)*4Ø96
14480 NEXT
14490 RESTORE +Ø
14500 FOR T%=Ø TO 4:READ keys1?T%:NEXT
14510 FOR T%=Ø TO 4:READ keys2?T%:NEXT
14520 FOR T%=Ø TO 11:emptyblock!(T%*4)=Ø:NEXT
14530 FOR T%=Ø TO 11:READ cotab?T%:NEXT
14540 FOR T%=Ø TO 32*2Ø-4 STEP 4
14550 bultab!T%=Ø:NEXT
14560 FOR T%=Ø TO 1Ø23
14570 D%=(T%*2 MOD1Ø24)
14580 IF D%<256 A%=D%/2
14590 IF D%>=256 AND D%<768 A%=127-(D%-256)/2
14600 IF D%>=768 A%=(D%-768)/2-127
14610 C%=127*SIN(RAD(36Ø/1Ø24*T%))
14620 A%=A%/5:C%=C%/5:G%=((T%/4) AND 255)/5
14630 table?T%=A%*2+C%*2+G%
14640 NEXT
14650 READ B$:WHILE B$<>"XXX"
14660 G%=ASC(B$)*8+char%:B$=""
14670 FOR H%=1 TO 4:READ A$:B$+=A$:NEXT
14680 FOR H%=Ø TO 7
14690 G%?H%=EVAL("&"+MID$(B$,H%*2+1,2))
14700 NEXT:READ B$
14710 ENDWHILE
14720 PROCmusic
14730 ENDPROC
14740 :
14750 DEF FNsoundcontrol(r%,m%,c%,p%,d%)
14760 [OPT PASS
14770 TST r%,#m%
14780 MOVNE RØ,#c%
14790 MOVNE R1,#&1ØØ
14800 ORRNE R1,R1,#&7F
14810 MOVNE R2,#p%
14820 MOVNE R3,#d%
14830 SWINE "Sound_Control"
14840 ]:=""
14850 :
14860 DATA -98,-67,-68,-83,-84
14870 DATA -1Ø6,-79,-75,-28,-92
14880 :
14890 DATA 4,2, 16,2, 28,2
14900 DATA 48,2, 6Ø,2, 72,2
14910 DATA A,FEC6,C6C6,FEC6,C6ØØ
14920 DATA B,FCCC,CCFE,C6C6,FEØØ
14930 DATA D,FCC6,C6C6,C6C6,FCØØ
14940 DATA F,FECØ,CØCØ,F8CØ,CØØØ
14950 DATA G,FECØ,CØDE,CCCC,FCØØ
14960 DATA P,FEC6,C6C6,FECØ,CØØØ
14970 DATA R,FEC6,C6C6,FECC,C6ØØ
14980 DATA S,FECØ,CØFE,Ø6Ø6,FEØØ
14990 DATA a,ØØØØ,FEC6,C6FE,C6ØØ
15000 DATA c,ØØØØ,FECØ,CØCØ,FEØØ
15010 DATA d,ØØØØ,FCC6,C6C6,FCØØ
15020 DATA e,ØØØØ,FECØ,F8CØ,FEØØ
15030 DATA f,ØØØØ,FECØ,F8CØ,CØØØ
15040 DATA h,ØØØØ,C6C6,FEC6,C6ØØ
15050 DATA i,ØØØØ,783Ø,3Ø3Ø,78ØØ
15060 DATA l,ØØØØ,CØCØ,CØCØ,FEØØ
15070 DATA m,ØØØØ,C6EE,FED6,C6ØØ
15080 DATA n,ØØØØ,C6E6,D6CE,C6ØØ
15090 DATA o,ØØØØ,FEC6,C6C6,FEØØ
15100 DATA p,ØØØØ,FEC6,C6FE,CØØØ
15110 DATA r,ØØØØ,FEC6,FECC,C6ØØ
15120 DATA s,ØØØØ,FECØ,FEØ6,FEØØ
15130 DATA t,ØØØØ,FC3Ø,3Ø3Ø,3ØØØ
15140 DATA u,ØØØØ,C6C6,C6C6,FEØØ
15150 DATA y,ØØØØ,C6C6,FEØ6,7EØØ
15160 DATA Ø,7CC6,C6C6,C6C6,7CØØ
15170 DATA 1,1818,1818,1818,18ØØ
15180 DATA 2,7CØ6,Ø67C,CØCØ,7CØØ
15190 DATA 3,7CØ6,Ø67C,Ø6Ø6,7CØØ
15200 DATA 4,C6C6,C67C,Ø6Ø6,Ø6ØØ
15210 DATA 5,7CCØ,CØ7C,Ø6Ø6,7CØØ
15220 DATA 6,7CCØ,CØ7C,C6C6,7CØØ
15230 DATA 7,7CØ6,Ø6Ø6,Ø6Ø6,Ø6ØØ
15240 DATA 8,7CC6,C67C,C6C6,7CØØ
15250 DATA 9,7CC6,C67C,Ø6Ø6,7CØØ
15260 DATA XXX
15270 :
15280 DEF PROCmusic
15290 DIM mus% 1Ø24
15300 FOR PASS=Ø TO 2 STEP 2
15310 P%=mus%:[OPT PASS
15320 .domusic
15330 ADR RØ,musicptr
15340 LDMIA RØ,{r4-r6}
15350 ADD R4,R4,RØ
15360 .noteloop
15370 LDR RØ,[R4],#4
15380 MOV R1,RØ,LSR #16
15390 BIC R1,R1,#3<<14
15400 CMP R5,R1
15410 BNE nextnote
15420 .donote
15430 AND R2,RØ,#255
15440 AND R3,R2,#&7C
15450 ANDS R2,R2,#3
15460 MOVEQ R2,#Ø
15470 TEQ R2,#1
15480 MOVEQ R2,#256
15490 ORREQ R2,R2,#&55
15500 TEQ R2,#2
15510 MOVEQ R2,#512
15520 ORREQ R2,R2,#&AA
15530 ORR R2,R2,R3,LSL #8
15540 MOV R1,#&1ØØ
15550 ORR R1,R1,#&7F
15560 MOV RØ,RØ,LSR #8
15570 AND R3,RØ,#255
15580 MOV RØ,R3,LSR #6
15590 AND R3,R3,#63
15600 SWI "Sound_Control"
15610 .nextnote
15620 SUBS R6,R6,#4
15630 BNE noteloop
15640 ADD R5,R5,#1
15650 LDR R7,maxclock
15660 CMP R5,R7
15670 LDRGT R5,newclock
15680 STR R5,clock
15690 LDR RØ,viboff
15700 ADD R1,RØ,#1
15710 CMP R1,#3
15720 MOVEQ R1,#Ø
15730 STR R1,viboff
15740 ADR R1,vibrato
15750 LDRB R5,[R1,RØ]
15760 MOV R5,R5,LSL #24
15770 MOV R5,R5,ASR #24
15780 MOV RØ,#1
15790 MOV R1,#8
15800 MOV R2,R5
15810 SWI "Sound_WriteControlBlock"
15820 MOV RØ,#2
15830 MOV R2,R5
15840 SWI "Sound_WriteControlBlock"
15850 MOV RØ,#3
15860 MOV R2,R5
15870 SWI "Sound_WriteControlBlock"
15880 MOVS PC,R14
15890 :
15900 .musicptr EQUD music-musicptr
15910 .clock EQUD Ø
15920 .musiclen EQUD 4
15930 .newclock EQUD Ø
15940 .maxclock EQUD Ø
15950 .viboff EQUD Ø
15960 :
15970 .vibrato FNr(32)
15980 :
15990 .music
16000 :
16010 ]:NEXT
16020 :
16030 FOR T%=Ø TO 2
16040 vibrato?T%=1Ø*SIN(RAD(36Ø/3*T%))
```

Continued ▶

DEATH BEFORE DISHONOUR

◀ **Continued**

```
16050 NEXT
16060 RESTORE +0
16070 M%=music
16080 a$="C C#D D#E F F#G G#A A#B"
16090 FOR chan%=1 TO 3
16100 L%=24:C%=0
16110 REPEAT
16120 READ b$
16130 IF b$="R" b$="RX"
16140 c$=LEFT$(b$,LENb$-1)
16150 IF INSTR(a$+"RX",c$) AND b$<>"XX"
THEN
16160 IF b$="RX" THEN
16170 C%+=L%/4
16180 ELSE
16190 J%=L%/24*5
16200 N%=(INSTR(a$,c$)-1)/2
16210 N%=(N% MOD 3) OR ((N% DIV3)<<2)
16220 N%=N% OR (VAL(RIGHT$(b$,1))+1)<<4
16230 !M%=(C%<<16) OR N% OR J%<<8 OR (ch
an%<<14)
16240 M%+=4:C%+=L%/4
16250 ENDIF
16260 ELSE
16270 IF b$<>"XX" AND b$<>"QX" L%=VAL(b$
)
16280 IF b$="QX" THEN !newclock=C%
16290 ENDIF
16300 UNTIL b$="XX"
16310 IF C%>!maxclock !maxclock=C%
16320 NEXT
16330 !musiclen=M%-music
16340 ENDPROC
16350 :
16360 DATA 24,D4,12,G3,A3,B3,C4
16370 DATA 24,D4,12,G3,R,24,G3
16380 DATA 24,E4,12,C4,D4,E4,F#4
16390 DATA 24,G4,12,G3,R,24,G3
16400 DATA 24,C4,12,D4,C4,B3,A3
16410 DATA 24,B3,12,C4,B3,A3,G3
16420 DATA 24,F#3,12,G3,A3,B3,G3
16430 DATA 24,B3,48,A3
16440 DATA 24,D4,12,G3,A3,B3,C4
16450 DATA 24,D4,12,G3,R,24,G3
16460 DATA 24,E4,12,C4,D4,E4,F#4
16470 DATA 24,G4,12,G3,R,24,G3
16480 DATA 24,C4,12,D4,C4,B3,A3
16490 DATA 24,B3,12,C4,B3,A3,G3
16500 DATA 24,A3,12,B3,A3,G3,F#3
16510 DATA 72,G3,QX
16520 DATA XX
16530 DATA 48,D3
16540 DATA XX
16550 DATA 48,G2,24,A2
16560 DATA 72,B2,C3,B2,A2,G2
16570 DATA 24,D3,B2,G2
16580 DATA D3,12,D2,C3,B2,A2
16590 DATA 48,B2,24,A2
16600 DATA G2,B2,G2
16610 DATA 72,C3,24,B2
16620 DATA 12,C3,B2,A2,G1
16630 DATA 48,A2,24,F#2
16640 DATA 48,G2,24,B2
16650 DATA C3,D3,D2
16660 DATA 72,G2
16670 DATA XX
```

PSION TRANSFER

Listing 1

```
10 REM >MakeSpr
20 REM Make sprites for Psion Transfe
r
30 REM by Ian Wilson
40 REM for Arc only
50 REM (c) BBC Acorn User March 1991
60 :
70 out=OPENOUT"!Sprites"
80 line=0
90 line$=""
100 sum=0
110 check=0
120 REPEAT
130 byte=FNnext
140 IF byte>= 0 BPUT #out,byte
150 UNTIL byte<0
160 CLOSE #out
170 *SetType !Sprites Sprite
180 END
190 :
200 DEF FNnext
210 IF line$="" THEN
220 READ line$
230 IF line$="end" THEN =-1
240 IF sum MOD 256<>check PRINT"Checks
um error at line ";430+line*10:END
250 line += 1
260 check = EVAL("&"+RIGHT$(line$,2))
270 sum = 0
280 end = INSTR(line$," ")
290 IF end = 0 end = INSTR(line$,"/")
300 line$ = LEFT$(line$,end-1)
310 ENDIF
320 len = 1
330 CASE LEFT$(line$,1) OF
340 WHEN "W":byte=0
350 WHEN "X":byte=68
360 WHEN "Y":byte=119
370 WHEN "Z":byte=255
380 OTHERWISE:byte=EVAL("&"+LEFT$(line
$,2)):len=2
390 ENDCASE
400 line$=MID$(line$,len+1)
410 sum+=byte
420 =byte
430 :
440 DATA 06WWW10WWW3809WW8001WW6669/A7
450 DATA 6C655F366134WWWW04WWW10WW /0F
460 DATA WWWWW07WWW2CWWW2CWWW0CWWW /6B
470 DATA YYYYYYYYYYYYYYYYYWWWYXX64 /4A
480 DATA XX64XX46XX64XXXYWWWYXX64X /90
490 DATA X64XX46XX64XXXYWWWY40X6004/04
500 DATA 0464XX06XX60XWXYWWWY04W64 /BC
510 DATA 40X6004404640046 4XXXYWWWY /D0
520 DATA XX6440X60XX4640046404W40Y /01
530 DATA WWWYXX6440X600440464 00464 /79
540 DATA XXXYWWWYWW60040464XX06XX60/FC
550 DATA 04W40YWWWYXX64XX64XX46XX64/C4
560 DATA XXXYWWWYXX64XX64XX46XX64X /90
570 DATA XXYWWWYWW6404W64WW46WW64W /EC
580 DATA XWYWWWY40046040X6004400640/44
590 DATA 0460W40WYWWWY400460W406404/DE
600 DATA 4006400460WW04YWWWYWW64XW /84
610 DATA 600440064004 60W04WYWWWYWX /84
620 DATA 6440X6004400640046 0WXWYWW /F1
630 DATA WYWX6404W64WW46WW64WX04YW /F0
640 DATA WWYYYYYYYYYYYYYYYYYWWWD402/BD
650 DATA WW217073696F6EWWWWWW04WWW /4E
660 DATA 10WWWWWWW07WWW2CWWW8001WW /C4
670 DATA 0CWWWWWW43XXXXXXXXXX03WWW /FA
680 DATA WWWWW2322222222222222222 /55
690 DATA 2203WWWWWWWW2301WWWWWWWW21/6A
700 DATA 03WWWWWWWW2301010101010101/2D
710 DATA 01012103WWWWWWWW2333333333/15
720 DATA 3333333332203WWWWWWWW23CC/13
730 DATA CCCCCCCCCCCCCCC2C03WWWWW /8F
740 DATA WWW405555555555555555545 /82
750 DATA WWWWWWWWW4065999669X4664X /6F
760 DATA 4645WWWWWWWWW40454554X4554/86
770 DATA X455445WWWWWWWWW4065X466F /C0
780 DATA ZF66F4F4645WWWWWWWWW404545/08
790 DATA 542FF8822F485445WWWWWWWWW /0D
800 DATA 4065X466FZF66F4F4645WWWWW /DC
810 DATA WWWW404545542FF8812F485445/D6
820 DATA WWWWWWWWW4065X466FZF6X9499/04
830 DATA 45WWWWWWWWW40555555555555 /83
840 DATA 5555545WWWWWWWWWXXXXXXXX /64
850 DATA XXX04WWWWWWWWXXXXXXXXXXX04/C0
860 DATA WWWWWWWWZZZZZZZZZZZ0FWWZZ /02
870 DATA ZWWWZZZZZZZZZZZZ0FWWZZZWWW /00
880 DATA ZZZZZZZZZZZ0FWWZZZWWWZZZZ /FD
890 DATA ZZZZZZZ0FWWZZZWWWZZZZZZZZ /FD
900 DATA ZZZ0FWWZZZWWWZZZZZZZZZZZ0F/0D
910 DATA WWZZZWWWF0ZZZZZZZZZZWWWZZ /E1
920 DATA ZWWWF0ZZZZZZZZZZWWWZZZWWW /E2
930 DATA F0ZZZZZZZZZZWWWZZZWWWF0ZZ /D1
940 DATA ZZZZZZZZWWWZZZWWWF0ZZZZZZ /DF
950 DATA ZZZZWWWZZZWWWF0ZZZZZZZZZZ /DF
960 DATA WWWZZZWWWF0ZZZZZZZZZZWWWZ /E2
970 DATA ZZWWWF0ZZZZZZZZZZWWWZZZWW /E1
980 DATA WF0ZZZZZZZZZZWWWZZZWWWZZZ /E0
990 DATA ZZZZZZZZ0FWWZZZWWWZZZZZZZ /FD
1000 DATA ZZZZ0FWWZZZ3401WW72616469 /DD
1010 DATA 6F6F6666WWWW02WWW0AWWWWWW /B6
1020 DATA W17WWW2CWWWB0WWW0CWWWYYYY /DB
1030 DATA YYYYYYYYYY07WYWYW70YYWYWW /70
1040 DATA YWWWYWWYWYWYWWWWWYWYYYYWW /A6
1050 DATA WWWWWYYWYWWWWWWWWWYYYYWWW /41
1060 DATA WWWWYYWYWYWWWWWYWYYYY07YW /AD
1070 DATA WWY70YYWYWWWYWYWWWYWYYYYY /04
1080 DATA YYYYYYYWWWWWZWWWWWZWWWWZZ /3D
1090 DATA ZWWWWZWWWZZZZZWWWWWWZZZZZ /F4
1100 DATA ZZWWZWZZZZZZZZZWZZZZZZZZZ /EB
1110 DATA ZZZZWZZZZZZZZZZWZWWZZZZZZZ /EB
1120 DATA WWZWWWZZZZZWWWZWWWWZZZWWW /F6
1130 DATA WWWWWWWZWWWWWZ3401WW726164/6A
1140 DATA 696F6F6EWWWWW02WWW0AWWWWW /C1
1150 DATA WW17WWW2CWWWB0WWW0CWWWYYY /64
1160 DATA YYYYYYYYYYY07WYWYW70YYWYW /E7
1170 DATA WYWWWYWWYWYWYWWAAWWYWYYYY /50
1180 DATA WWAAAAAAAWWYYWYWWAAAAAAAAAAA/B5
1190 DATA WWYYYYWWAAAAAAAWWYYWYWYWWAA/60
1200 DATA WWYWYYYY07YWWWY70YYWYWWWY /94
1210 DATA WYWWWYWYYYYYYYYYYYYWWWWWZ /81
1220 DATA WWWWWZWWWWZZZWWWWZWWWZZZZ /F7
1230 DATA ZWWWWWWZZZZZZZWWZWZZZZZZZ /F0
1240 DATA ZZWZZZZZZZZZZZZZZWZZZZZZZZ /E9
1250 DATA ZWZWWZZZZZZZWWZWWWZZZZZWW /F1
1260 DATA WZWWWWZZZWWWWWWWWWWZWWWWW /FB
1270 DATA Z8001WW66696C655F366135WW /4B
1280 DATA WW04WWW10WWWWWWW07WWW2CWW /47
1290 DATA W2CWWW0CWWWYYYYYYYYYYYYY /BA
1300 DATA YYY07WWYWWWWWWWWWWWWWWWY07/61
1310 DATA WWYWYYYYWYYWW70YYWWY07WWY /94
1320 DATA WW7007WY0770YW70077007WY07/48
1330 DATA WWYWW70077007WW700770YY07 /41
1340 DATA WY07WWYWW700770YYYY077007 /36
1350 DATA WYWY07WWYWW70077007WW7007 /D1
1360 DATA 7007WYWY07WWYWW70077007WW /D1
1370 DATA 700770YY07WY07WWYWWWWWWWW /D1
1380 DATA WWWWW8808Y07WWYWWWWWWWWWW /85
1390 DATA WW88F888Y07WWYWYYY33Y3770 /B3
1400 DATA 3703W88F888WY07WWYWWWWWWW /37
1410 DATA WWW88F888WWY07WWYWYY030773/68
1420 DATA YYW88F888307307YWWWYWWWWW /8E
1430 DATA WWW88F888WWWWYWWWYWY3773Y /8E
1440 DATA 70WEEEE88W70YY07YWWWYWWWW /27
1450 DATA WWE0EEWWWWWWWYWWWYYYYYYYY /FD
1460 DATA YYYYYYYYY07WWECWWW21736D5F/82
1470 DATA 7073696F6EWWW02WWW07WWWWW /32
1480 DATA WW03WWW2CWWW8CWWW0CWWWXXX /93
1490 DATA XXXXX04WWWX1111111111141 /43
1500 DATA 04WWWX11111111111104WWW /F3
1510 DATA XXXXXXXX04WWWX9449XXXXX04 /9D
1520 DATA WWWXXF4F7F7F7F7X04WWWXXF4 /1C
1530 DATA ZZZZX04WWWXXF4F7F7F7F7X04 /E4
1540 DATA WWZZZZZZZZZZZZZZZZZZZZZZ /EA
1550 DATA ZZZZZZZZZZZZZZZZZZZZZZZZZ /E7
1560 DATA ZF0ZZZZZZZZF0ZZZF0ZZZZZZZF0/AE
1570 DATA ZZZF0ZZZZZZZF0ZZZF0ZZZZZZ /BD
1580 DATA ZF0ZZZ                     /EC
1590 DATA end
```

Listing 2

```
10 REM >MakeTpl
20 REM Template file maker for Psion
File Transfer Program
30 REM By Ian Wilson
40 REM for Arc only
50 REM (c) BAU March 1991
60 :
70 out%=OPENOUT "Templates"
80 FOR i%=1 TO 1100
90 READ byte$
100 byte%=EVAL("&"+byte$)
110 BPUT# out%,byte%
120 NEXT
130 CLOSE# out%
140 :
150 *SetType Templates fec
160 :
170 DATA FF,FF,FF,FF,00,00,00
180 DATA 00,00,00,00,00,00,00
190 DATA 00,00,44,00,00,00,BA
200 DATA 01,00,00,01,00,00,00
210 DATA 69,6E,66,6F,0D,00,00
220 DATA 00,00,00,00,00,FE,01
230 DATA 00,00,4E,02,00,00,01
240 DATA 00,00,00,73,61,76,65
250 DATA 72,0D,00,00,00,00,00
260 DATA 00,00,00,00,00,5E,02
270 DATA 00,00,70,00,00,00,FE
280 DATA 04,00,00,70,01,00,00
290 DATA 00,00,00,00,00,00,00
300 DATA 00,30,07,00,00,93,00
310 DATA 05,04,07,02,07,01,03
320 DATA 01,0C,00,00,00,00,00
330 DATA 00,FF,FF,FF,A0,02,00
340 DATA 00,00,00,00,00,3D,01
350 DATA 00,00,00,30,00,00,01
360 DATA 00,00,00,00,00,00,00
370 DATA 78,01,00,00,FF,FF,FF
380 DATA FF,13,00,00,00,09,00
390 DATA 00,00,8C,00,00,00,C0
400 DATA FF,FF,FF,D8,00,00,00
410 DATA F0,FF,FF,FF,19,60,00
420 DATA C7,4E,61,6D,65,0D,74
430 DATA 6C,65,64,3E,0D,7F,60
440 DATA 00,00,00,84,FF,FF,FF
450 DATA DC,00,00,00,B4,FF,FF
460 DATA FF,19,60,00,C7,50,75
470 DATA 72,70,6F,73,65,0D,64
480 DATA 3E,0D,7F,2E,00,00,00
490 DATA 4C,FF,FF,FF,DA,00,00
500 DATA 00,74,FF,FF,FF,19,60
510 DATA 00,C7,57,72,69,74,74
520 DATA 65,6E,20,62,79,0D,7F
530 DATA 88,01,00,00,B4,FE,FF
540 DATA FF,04,02,00,00,E0,FE
550 DATA FF,FF,19,60,00,C7,56
560 DATA 65,72,73,69,6F,6E,0D
570 DATA 64,3E,0D,7F,DE,00,00
580 DATA 00,C0,FF,FF,FF,1A,02
590 DATA 00,00,F0,FF,FF,FF,3D
600 DATA 61,00,07,8B,01,00,00
610 DATA FF,FF,FF,FF,14,00,00
620 DATA 00,DE,00,00,00,84,FF
630 DATA FF,FF,8A,02,00,00,B4
640 DATA FF,FF,FF,3D,61,00,07
650 DATA 9F,01,00,00,FF,FF,FF
660 DATA FF,1B,00,00,00,DE,00
670 DATA 00,00,48,FF,FF,FF,8E
680 DATA 01,00,00,78,FF,FF,FF
690 DATA 3D,60,00,07,49,61,6E
700 DATA 20,57,69,6C,73,6F,6E
710 DATA 0D,7F,DE,00,00,00,0C
720 DATA FF,FF,FF,1A,01,00,00
730 DATA 3C,FF,FF,FF,3D,60,00
740 DATA 07,31,2E,32,0D,69,74
750 DATA 6C,65,64,3E,0D,7F,5E
760 DATA 00,00,00,0C,FF,FF,FF
770 DATA 0E,01,00,00,3C,FF,FF
780 DATA FF,11,60,00,C7,56,65
790 DATA 72,73,69,6F,6E,0D,64
800 DATA 3E,0D,7F,41,62,6F,75
810 DATA 74,20,74,68,69,73,20
820 DATA 70,72,6F,67,72,61,6D
830 DATA 0D,50,73,69,6F,6E,20
840 DATA 46,69,6C,65,20,54,72
850 DATA 61,6E,73,66,65,72,0D
860 DATA 50,73,69,6F,6E,20,74
870 DATA 6F,20,41,72,63,20,64
880 DATA 61,74,61,20,74,72,61
890 DATA 6E,73,66,65,72,0D,C8
900 DATA 03,00,00,04,02,00,00
910 DATA FE,04,00,00,D0,03,00
920 DATA 00,00,00,00,00,00,00
930 DATA 00,00,34,07,00,00,93
940 DATA 00,07,04,07,02,07,01
950 DATA 03,01,02,00,00,00,00
960 DATA 00,34,FE,FF,FF,36,01
970 DATA 00,00,00,00,00,00,3D
980 DATA 01,00,00,00,30,00,00
990 DATA 01,00,00,00,00,00,00
1000 DATA 00,18,02,00,00,FF,FF
1010 DATA FF,FF,13,00,00,00,0E
1020 DATA 00,00,00,2C,00,00,00
1030 DATA 9C,FF,FF,FF,70,00,00
1040 DATA 00,E0,FF,FF,FF,3A,61
1050 DATA 00,17,1F,02,00,00,FF
1060 DATA FF,FF,FF,0C,00,00,00
1070 DATA E4,02,00,00,14,00,00
1080 DATA 00,28,03,00,00,58,00
1090 DATA 00,00,3E,60,00,C7,4C
1100 DATA 4F,47,4F,0D,74,6C,65
1110 DATA 64,3E,0D,7F,D4,00,00
1120 DATA 00,9C,FF,FF,FF,00,01
1130 DATA 00,00,CC,FF,FF,FF,3D
1140 DATA 90,02,C7,4F,4B,0D,74
1150 DATA 69,74,6C,65,64,3E,0D
1160 DATA 7F,FC,FF,FF,FF,CC,FE
1170 DATA FF,FF,AC,00,00,00,FC
1180 DATA FE,FF,FF,19,00,00,C7
1190 DATA 46,6F,72,6D,61,74,3A
1200 DATA 0D,64,3E,0D,7F,62,00
1210 DATA 00,00,A4,FE,FF,FF,BE
1220 DATA 00,00,00,C4,FE,FF,FF
1230 DATA 19,00,00,C7,50,73,69
1240 DATA 6F,6E,0D,6C,65,64,3E
1250 DATA 0D,7F,72,00,00,00,74
1260 DATA FE,FF,FF,BE,00,00,00
1270 DATA 94,FE,FF,FF,19,00,00
1280 DATA C7,45,64,69,74,0D,74
1290 DATA 6C,65,64,3E,0D,7F,80
1300 DATA 00,00,00,44,FE,FF,FF
1310 DATA C2,00,00,00,70,FE,FF
1320 DATA FF,39,60,00,17,54,61
1330 DATA 62,0D,69,74,6C,65,64
1340 DATA 3E,0D,7F,12,00,00,00
1350 DATA 58,FF,FF,FF,9E,00,00
1360 DATA 00,78,FF,FF,FF,19,00
1370 DATA 00,C7,53,61,76,65,20
1380 DATA 61,73,3A,0D,3E,0D,7F
1390 DATA 1A,00,00,00,18,FF,FF
1400 DATA FF,1E,01,00,00,48,FF
1410 DATA FF,FF,3D,F1,00,07,29
1420 DATA 02,00,00,FF,FF,FF,FF
1430 DATA 20,00,00,00,DE,00,00
1440 DATA 00,A0,FE,FF,FF,0A,01
1450 DATA 00,00,CC,FE,FF,FF,3A
1460 DATA 31,00,17,33,02,00,00
1470 DATA FF,FF,FF,FF,0C,00,00
1480 DATA 00,DE,00,00,00,74,FE
1490 DATA FF,FF,0A,01,00,00,A0
1500 DATA FE,FF,FF,3A,31,00,17
1510 DATA 3C,02,00,00,FF,FF,FF
1520 DATA FF,0C,00,00,00,DE,00
1530 DATA 00,00,48,FE,FF,FF,0A
1540 DATA 01,00,00,74,FE,FF,FF
1550 DATA 3A,31,00,17,45,02,00
1560 DATA 00,FF,FF,FF,FF,0C,00
1570 DATA 00,00,BC,01,00,00,38
1580 DATA 01,00,00,02,02,00,00
1590 DATA 7C,01,00,00,3E,60,00
```

Continued ▶

◀ **Continued**

```
1600 DATA C7,4C,4F,47,4F,0D,74
1610 DATA 6C,65,64,3E,0D,7F,78
1620 DATA FF,FF,FF,94,FF,FF,FF
1630 DATA BC,FF,FF,FF,D8,FF,FF
1640 DATA FF,3E,60,00,C7,66,69
1650 DATA 6C,65,5F,64,64,65,0D
1660 DATA 3E,0D,7F,49,6D,70,6F
1670 DATA 72,74,0D,66,69,6C,65
1680 DATA 5F,6C,6F,67,6F,0D,50
1690 DATA 53,49,4F,4E,66,69,6C
1700 DATA 65,0D,52,61,64,69,6F
1710 DATA 6F,66,66,0D,52,61,64
1720 DATA 69,6F,6F,66,66,0D,52
1730 DATA 61,64,69,6F,6F,66,66
1740 DATA 0D
```

Listing 3

```
10 REM >!RunImage
20 REM by Ian Wilson
30 REM for Arc only
40 REM (c) BAU March 1991
50 :
60 ON ERROR PROCerror
70 PROCsetup
80 PROCmain
90 PROCfinish
100 END
110 :
120 DEF PROCsetup
130 alias$="<Psion$Dir>"
140 version$="1.08 - 6-Oct-89"
150 DIM q% 500, block% 1000,menblk% 1000
160 DIM r% 500
170 DIM s% 500
180 DIM main_blk% 50
190 DIM icontext%36
200 DIM iconvalid%36
210 DIM load% 100,save% 100
220 DIM load_dat% 255, save_dat% 255
230 DIM useful% 700
240 $q%="TASK"
250 SYS "Wimp_Initialise",200,!q%,"Psion" TO ,handle%
260 iconh%=FNiconbar("!Psion")
270 saver%=FNtemplates(alias$+".Templates")
280 PROCsave_icon(&6a4)
290 f$="PSIONfile" : PROCset_savename(f$)
300 PROCload_menus
310 ENDPROC
320 :
330 DEF PROCload_menus
340 lm%=OPENIN(alias$+".Menu")
350 dim%=EXT#lm%
360 CLOSE#lm%
370 DIM menu_data% dim%+32
380 OSCLI "LOAD "+alias$+".Menu "+STR$~(menu_data%)
390 current_menu$=""
400 ENDPROC
410 :
420 DEF PROCmain
430 REPEAT
440 PROCpoll
450 UNTIL FALSE :REM (reason%=17 OR reason%=18) AND block%!16=0
460 ENDPROC
470 :
480 DEF FNiconbar(spname$)
490 $iconvalid%="S!PSION"
500 $icontext%="PFT"
510 !block%=-2
520 block%!4=0
530 block%!8=-16
540 block%!12=78
550 block%!16=90
560 block%!20=%00010111000000000011000100101011
570 block%!24=icontext%
580 block%!28=iconvalid%
590 block%!32=LEN($icontext%)+1
600 SYS "Wimp_CreateIcon",,block% TO icon%
610 =icon%
620 :
630 DEF PROCpoll
640 !block%=0
650 SYS "Wimp_Poll",6195,block% TO reason%
660 IF reason% PROCaction(reason%)
670 ENDPROC
680 :
690 DEF PROCaction(reason%)
700 CASE reason% OF
710 WHEN 2 : PROCopen
720 WHEN 3 : PROCclose
730 WHEN 6 : PROCcheck_mouse(!block%,block%!4,block%!8,block%!12)
740 WHEN 7 : f$=FNlastbit(f$) : PROCimport
750 WHEN 9 : PROCmenu_select
760 WHEN 17,18 : PROCmessage
770 ENDCASE
780 ENDPROC
790 :
800 DEF PROCcheck_mouse(mx%,my%,but%,hnd%)
810 CASE but% OF
820 WHEN 2 : IF hnd%=-2 THEN
830 PROCcreate_icon_menu("Psion",mx%)
840 ENDIF
850 WHEN 4 : CASE hnd% OF
860 WHEN -2 : PROCtellemoff(" To export, drag file icon to PSION icon...To import, select 'import' from icon menu")
870 WHEN saver% : PROCsel_icon
880 ENDCASE
890 WHEN 1 : CASE hnd% OF
900 REM WHEN saver% : PROCsel_icon
910 ENDCASE
920 ENDCASE
930 ENDPROC
940 :
950 DEF PROCcreate_menu(title$,x%,y%)
960 menuy%=y%
970 PROCbuild_menu(title$,menuy%)
980 menux%=x%-64
990 menuy%=y%
1000 SYS "Wimp_CreateMenu",,blk%,menux%,menuy%
1010 ENDPROC
1020 :
1030 DEF PROCcreate_icon_menu(title$,x%)
1040 menuy%=0
1050 PROCbuild_menu(title$,menuy%)
1060 menux%=x%-64
1070 SYS "Wimp_CreateMenu",,blk%,menux%,menuy%
1080 ENDPROC
1090 :
1100 DEF PROCbuild_menu(title$,RETURN height%)
1110 LOCAL offset%,i%,menuItems%,dots%,wimpflags,flags,ptr%,name$,ptr$
1120 offset%=FNfind_menu(title$,menu_data%)
1130 IF offset%=TRUE THEN ERROR 42,"Can't find menu data"
1140 blk$=FNget_menu_item(menu_data%,offset%)
1150 blk%=EVAL(blk$)
1160 $blk%=LEFT$(title$,12)
1170 blk%?12=7
1180 blk%?13=2
1190 blk%?14=7
1200 blk%?15=0
1210 blk%!16=172
1220 blk%!20=44
1230 blk%!24=0
1240 i%=28
1250 menuItems%=0
1260 dots%=0
1270 WHILE menu_data%?offset%<>ASC"~" AND menu_data%?offset%<>ASC"^"
1280 PROCmenu_item
1290 IF RIGHT$(name$,1)="@" THEN name$=LEFT$(name$,LENname$-1):ptr$=FNbuild_submenu(name$,pos%)
1300 IF (flags AND 4)=4 THEN
1310 instr%=INSTR(ptr$,",")
1320 blk%!(i%+12)=EVAL(LEFT$(ptr$,instr%-1))
1330 ptr$=MID$(ptr$,instr%+1)
1340 instr%=INSTR(ptr$,",")
1350 blk%!(i%+16)=EVAL(LEFT$(ptr$,instr%-1))
1360 ptr$=MID$(ptr$,instr%+1)
1370 blk%!(i%+20)=EVAL(ptr$)
1380 wimpflags=wimpflags OR 2^8
1390 ptr%=-1
1400 $(blk%!(i%+12))=LEFT$(name$,blk%!(i%+20))
1410 ELSE
1420 $(blk%+i%+12)=LEFT$(name$,12)
1430 ptr%=EVAL(ptr$)
1440 ENDIF
1450 blk%!i%=flags
1460 blk%!(i%+4)=ptr%
1470 blk%!(i%+8)=wimpflags
1480 i%=i%+24
1490 menuItems%+=1
1500 ENDWHILE
1510 height%=96+(menuItems%*44)+(dots%*24)
1520 current_menu$=LEFT$($blk%,12)
1530 ENDPROC
1540 :
1550 DEF PROCmenu_item
1560 wimpflags=&7000021
1570 flags=0
1580 ptr$="-1"
1590 func$=""
1600 name$=FNget_menu_item(menu_data%,offset%)
1610 IF menu_data%?offset%=ASC"!" offset%+=1:ptr$=FNget_menu_item(menu_data%,offset%)
1620 IF menu_data%?offset%=ASC"{" offset%+=1:wimpflags=EVAL(FNget_menu_item(menu_data%,offset%))
1630 IF menu_data%?offset%=ASC"\" offset%+=1:func$=FNget_menu_item(menu_data%,offset%)
1640 IF menu_data%?offset%=ASC"~" OR menu_data%?offset%=ASC"^" flags=flags OR &80
1650 IF LEFT$(name$,1)="}" THEN flags+=1:name$=MID$(name$,2)
1660 IF LEFT$(name$,1)="#" THEN flags+=4:name$=MID$(name$,2)
1670 IF RIGHT$(name$,1)="}" THEN flags+=2:name$=LEFT$(name$,LENname$-1):dots%+=1
1680 ENDPROC
1690 :
1700 DEF FNbuild_submenu(title$,pos%)
1710 LOCAL blk$,blk%
1720 PROCbuild_menu(title$,pos%)
1730 =blk$
1740 :
1750 DEF PROCmenu_select
1760 SYS "Wimp_GetPointerInfo",,q%
1770 but%=q%!8
1780 depth%=0
1790 PROCdecode_menu(current_menu$)
1800 IF (but% AND 1)=1 THEN
1810 PROCre_openmenu(current_menu$,menux%,menuy%)
1820 ELSE
1830 current_menu$=""
1840 ENDIF
1850 ENDPROC
1860 :
1870 DEF PROCre_openmenu(title$,menx%,meny%)
1880 offset%=FNfind_menu(title$,menu_data%)
1890 blk%=EVAL(FNget_menu_item(menu_data%,offset%))
1900 SYS "Wimp_CreateMenu",,blk%,menx%,meny%
1910 current_menu$=title$
1920 ENDPROC
1930 :
1940 DEF PROCdecode_menu(title$)
1950 LOCAL men_loop%,func$
1960 offset%=FNfind_menu(title$,menu_data%)
1970 blk%=EVAL(FNget_menu_item(menu_data%,offset%))
1980 men_loop%=0
1990 WHILE men_loop%<=block%!depth%
2000 dots%=0
2010 PROCmenu_item
2020 men_loop%+=1
2030 ENDWHILE
2040 IF block%!depth%>-1 THEN
2050 IF RIGHT$(name$,1)="@" THEN
2060 name$=LEFT$(name$,LENname$-1)
2070 depth%+=4
2080 PROCdecode_menu(name$)
2090 ENDIF
2100 IF func$<>"" THEN a=EVAL("FN"+func$)
2110 ENDIF
2120 ENDPROC
2130 :
2140 DEF FNtemplates(file$)
2150 DIM Q% 2048, P% 2048
2160 maxws%=&100
2170 DIM indir% maxws%, indir2% maxws%
2180 SYS "Wimp_OpenTemplate",,file$
2190 SYS "Wimp_LoadTemplate",,Q%,indir%,indir%+maxws%,-1,"info",0
2200 SYS "Wimp_LoadTemplate",,P%,indir2%,indir2%+maxws%,-1,"saver",0
2210 SYS "Wimp_CreateWindow",,Q% TO info%
2220 SYS "Wimp_CreateWindow",,P% TO saver%
2230 SYS "Wimp_CloseTemplate"
2240 =saver%
2250 :
2260 DEF PROCfinish
2270 SYS "Wimp_CloseDown",handle%,!q%
2280 END
2290 ENDPROC
2300 :
2310 DEF PROCerror
2320 SYS "Wimp_DragBox",,0
2330 !block%=ERR
2340 error=TRUE
2350 CASE ERR OF
2360 WHEN 17 :
2370 SYS "OS_Byte",229,1,0
2380 SYS "OS_Byte",124
2390 SYS "Hourglass_Off"
2400 CLOSE#0
2410 $(block%+4)="Quit transfer"
2420 error=FALSE
2430 WHEN 222 : $(block%+4)="This file does not exist"+CHR$0:error=FALSE
2440 OTHERWISE
2450 $(block%+4)="(Internal error code "+STR$(ERL)+") "+REPORT$+CHR$0
2460 ENDCASE
2470 flags=1
2480 SYS "Wimp_ReportError",block%,flags,"PFT"
2490 IF error THEN PROCfinish ELSE PROCmain:END
2500 ENDPROC
2510 :
2520 DEF PROCcreate_window
2530 !block%=main%
2540 block%!4=300
2550 block%!8=300
2560 block%!12=1142
2570 block%!16=780
2580 block%!20=0
2590 block%!24=0
2600 block%!28=-1
2610 SYS "Wimp_OpenWindow",,block%
2620 ENDPROC
2630 :
2640 DEF PROCclose
2650 SYS "Wimp_CloseWindow",,block%
2660 ENDPROC
2670 :
2680 DEF PROCopen
2690 SYS "Wimp_OpenWindow",,block%
2700 ENDPROC
2710 :
2720 DEF FNget_menu_item(db%,RETURN off%)
2730 LOCAL st$
2740 WHILE db%?off%<>10 AND db%?off%<>13
2750 st$+=CHR$(db%?off%)
2760 off%+=1
2770 ENDWHILE
2780 off%+=1
2790 =st$
2800 :
2810 DEF FNfind_menu(name$,data%)
2820 LOCAL fi$
2830 name$="^"+name$
2840 offset%=0
2850 REPEAT
2860 fi$=FNget_menu_item(data%,offset%)
2870 UNTIL fi$=name$ OR fi$="~"
2880 IF fi$="~" THEN =TRUE
2890 =offset%
2900 :
2910 DEF FNfin
2920 PROCfinish
2930 =0
2940 :
2950 DEFPROCsel_icon
2960 icon%=block%!16
2970 PROCfile_icon(icon%)
2980 ENDPROC
2990 :
3000 DEFPROCfile_icon(kind%)
3010 CASE kind% OF
3020 WHEN 0 :f$=FNget_savename : PROCsave_dragbox
3030 WHEN 2 :f$=FNget_savename : PROCquicksave
3040 WHEN 9 :PROCsave_icon(&6a4)
3050 WHEN 10:PROCsave_icon(&fff)
3060 WHEN 11:PROCsave_icon(&6a5)
3070 ENDCASE
3080 ENDPROC
3090 :
3100 DEFPROCsave_icon(kind%)
3110 type%=kind%
3120 !r%=saver%
3130 r%!4=0
3140 SYS "Wimp_GetIconState",,r%
3150 $r%!28="file_"+STR$~(kind%)+CHR$(0)
3160 r%!8=1 :r%!12=13
3170 SYS "Wimp_SetIconState",,r%
3180 CASE kind% OF
3190 WHEN &6a4:select%=9
3200 WHEN &fff:select%=10
3210 WHEN &6a5:select%=11
3220 OTHERWISE select%=0
3230 ENDCASE
3240 FOR i%=9 TO 11
3250 r%!4=i%
3260 SYS "Wimp_GetIconState",,r%
3270 IF i%=select% THEN $r%!28="radioon" ELSE $r%!28="radiooff"
3280 r%!8=1:r%!12=13
3290 SYS "Wimp_SetIconState",,r%
3300 NEXT
3310 ENDPROC
3320 :
3330 DEFPROCsave_dragbox
3340 LOCAL x%,y%,ysize%
3350 !r%=saver%
3360 SYS "Wimp_GetWindowState",,r%
3370 ysize%=r%!16-r%!8
```

Continued ▶

PSION TRANSFER

◀ Continued

```
3380 x%=r%!4
3390 y%=r%!8
3400 r%!4=0
3410 SYS "Wimp_GetIconState",,r%
3420 f$=FNlastbit(f$)
3430 r%!8+=x%
3440 r%!12+=y%+ysize%
3450 r%!16+=x%
3460 r%!20+=y%+ysize%
3470 r%!24=0
3480 r%!28=0
3490 r%!32=1279
3500 r%!36=1023
3510 !r%=0
3520 r%!4=5
3530 dragging%=TRUE
3540 SYS "Wimp_DragBox",,r%
3550 ENDPROC
3560 :
3570 DEFPROCtellemoff(e$)
3580 LOCAL er%
3590 er%=useful%
3600 !er%=0
3610 $(er%+4)=e$+CHR$(0)
3620 SYS "Wimp_ReportError",er%,1,"P F T"
3630 ENDPROC
3640 :
3650 DEFPROCimport
3660 SYS "Wimp_GetPointerInfo",,r%
3670 r%!32=r%!4 : thirtytwo%=r%!32
3680 r%!28=!r% : twentyeight%=r%!28
3690 r%!24=r%!16 : twentyfour%=r%!24
3700 r%!20=r%!12 : twenty%=r%!20
3710 r%!16=1
3720 r%!12=0
3730 r%!36=0
3740 r%!40=0
3750 !r%=64
3760 $(r%+44)=f$
3770 SYS "Wimp_SendMessage",17,r%,r%!20,r%!24
3780 myref%=r%!8
3790 ENDPROC
3800 :
3810 DEFPROCload
3820 LOCAL type%,fname$
3830 type%=block%!40
3840 fname$=$(block%+44)
3850 IF INSTR(fname$,":")<1 AND INSTR(fname$,".")<1 THEN scrap%=TRUE ELSE scrap%=FALSE
3860 PROCload_disc(fname$,type%)
3870 ENDPROC
3880 :
3890 DEFPROCmessage
3900 your_ref%=block%!8
3910 CASEblock%!16 OF
3920 WHEN 4 :scrap%=FALSE
3930 WHEN 3 :PROCload
3940 WHEN 2 :PROCdosave
3950 WHEN 1 :IF block%!4<>handle% THEN PROCload_app
3960 ENDCASE
3970 ENDPROC
3980 :
3990 DEFPROCdosave
4000 IF INSTR($(block%+44),"Wimp$Scrap") THEN scrap%=TRUE ELSE scrap%=FALSE
4010 IF INSTR($(block%+44),"Printer$Scrap") THEN printing%=TRUE : $(block%+44)="printer:" ELSE printing%=FALSE
4020 PROCset_savename($(block%+44))
4030 PROCsave_disc
4040 ENDPROC
4050 :
4060 DEFPROCsave_disc
4070 LOCAL i%,byte%
4080 test%=TRUE
4090 datafile%=TRUE
4100 SYS "OS_Byte",229,0,0
4110 SYS "Hourglass_On"
4120 in%=OPENIN("Serial:")
4130 out%=OPENOUT(f$)
4140 REPEAT
4150 SYS "OS_BGet",,in% TO byte%
4160 byte%=FNfilter(byte%,type%)
4170 IF byte%>1 THEN SYS "OS_BPut",byte%,out%
4180 IF end_byte% THEN SYS "OS_BPut",end_byte%,out%
4190 i%+=1
4200 UNTIL byte%=26 OR byte%=1
4210 CLOSE# in%
4220 CLOSE# out%
4230 !r%=64
4240 r%!20=twenty%
4250 r%!24=twentyfour%
4260 r%!28=twentyeight%
4270 r%!32=thirtytwo%
4280 r%!12=your_ref%
4290 r%!16=3
4300 r%!36=0
4310 r%!40=type%
4320 $(r%+44)=f$
4330 IF NOT printing% THEN
4340 SYS "Wimp_SendMessage",17,r%,r%!20
4350 SYS "OS_File",18,f$,type%
4360 ENDIF
4370 SYS "Hourglass_Off"
4380 SYS "OS_Byte",229,1,0
4390 SYS "OS_Byte",124
4400 PROCsave_icon(type%)
4410 SYS "Wimp_CreateMenu",,-1
4420 ENDPROC
4430 :
4440 DEFPROCset_savename(g$)
4450 f$=g$
4460 IF INSTR(f$,"<Wimp$Scrap>") OR INSTR(f$,"printer:") THEN ENDPROC
4470 !s%=saver%
4480 s%!4=8
4490 SYS "Wimp_GetIconState",,s%
4500 s%!8=1
4510 s%!12=1
4520 $s%!28=f$
4530 SYS "Wimp_SetIconState",,s%
4540 ENDPROC
4550 :
4560 DEFFNget_savename
4570 LOCAL f%
4580 !s%=saver%
4590 s%!4=8
4600 SYS "Wimp_GetIconState",,s%
4610 f%=s%!28
4620 =$f%
4630 :
4640 DEFPROCquicksave
4650 IF INSTR(f$,":")<1 AND INSTR(f$,".")<1 THEN
4660 PROCtellemoff("To import, drag the icon to a directory viewer")
4670 ELSE
4680 PROCsave_disc
4690 ENDIF
4700 ENDPROC
4710 :
4720 DEFFNlastbit(s$)
4730 WHILE INSTR(s$,":")>0
4740 s$=MID$(s$,INSTR(s$,":")+1)
4750 ENDWHILE
4760 WHILE INSTR(s$,".")>0
4770 s$=MID$(s$,INSTR(s$,".")+1)
4780 ENDWHILE
4790 =s$
4800 :
4810 DEFPROCload_disc(fname$,kind%)
4820 LOCAL byte%
4830 type%=kind%
4840 check%=TRUE
4850 datafile%=FALSE : extra_byte%=0 : end_byte%=0
4860 SYS "OS_Byte",229,0,0
4870 SYS "Hourglass_On"
4880 in%=OPENIN (fname$)
4890 IF type%<>&6a4 THEN
4900 IF FNfile THEN
4910 datafile%=TRUE
4920 IF type%=&fff THEN type%=FNget_type
4930 ENDIF
4940 ENDIF
4950 out%=OPENOUT ("serial:")
4960 REPEAT
4970 byte%=BGET#in%
4980 IF datafile% THEN byte%=FNunfilter(byte%,type%)
4990 IF extra_byte% THEN BPUT#out%,extra_byte%
5000 BPUT#out%,byte%
5010 IF end_byte% THEN BPUT#out%,end_byte%
5020 UNTIL EOF#in%
5030 IF byte%<>26 THEN BPUT# out%,26
5040 CLOSE# out%
5050 CLOSE# in%
5060 SYS "Hourglass_Off"
5070 SYS "OS_Byte",229,1,0
5080 SYS "OS_Byte",124
5090 IF scrap% THEN
5100 *Remove <Wimp$Scrap>
5110 scrap%=FALSE
5120 ENDIF
5130 ENDPROC
5140 :
5150 DEFPROCload_app
5160 !r%=64
5170 r%!12=your_ref%
5180 r%!20=block%!20
5190 r%!24=block%!24
5200 r%!28=block%!24
5210 r%!32=block%!32
5220 r%!36=-1
5230 r%!16=2
5240 $(r%+44)="<Wimp$Scrap>"
5250 SYS "Wimp_SendMessage",17,r%,block%!4
5260 scrap%=TRUE
5270 ENDPROC
5280 :
5290 DEFFNfilter(b%,t%)
5300 LOCAL c%
5310 end_byte%=0
5320 CASE t% OF
5330 WHEN &6a4
5340 CASE b% OF
5350 WHEN ASC(":") : IF test% : c%=b% : datafile%=FALSE
5360 OTHERWISE c%=b%
5370 ENDCASE
5380 WHEN &fff :
5390 CASE b% OF
5400 WHEN ASC(":") : IF test% : c%=b% : datafile%=FALSE
5410 WHEN 9 : c%=10
5420 WHEN 13 : c%=10
5430 WHEN 10 : c%=10 :test%=FALSE :IF datafile% THEN end_byte%=10
5440 WHEN 26 : c%=1
5450 OTHERWISE c%=b%
5460 ENDCASE
5470 WHEN &6a5 :
5480 CASE b% OF
5490 WHEN 17 : c%=0
5500 WHEN 26 : c%=1
5510 OTHERWISE c%=b%
5520 ENDCASE
5530 ENDCASE
5540 =c%
5550 :
5560 DEFFNunfilter(b%,t%)
5570 LOCAL c%
5580 extra_byte%=0 : end_byte%=0
5590 CASE t% OF
5600 WHEN &6a4 : c%=b%
5610 WHEN &6a5 : c%=b%
5620 WHEN &fff
5630 CASE b% OF
5640 WHEN 10 :
5650 IF check% THEN
5660 IF FNnextbyte=10 THEN c%=0 :check%=FALSE : ELSE c%=9
5670 ELSE check%=TRUE : c%=10
5680 WHEN 13 : c%=0
5690 ENDIF
5700 OTHERWISE c%=b%
5710 ENDCASE
5720 OTHERWISE c%=b%
5730 ENDCASE
5740 =c%
5750 :
5760 DEFFNnextbyte
5770 LOCAL b%,pointer%
5780 pointer%=PTR# in%
5790 b%=BGET# in%
5800 PTR# in%=pointer%
5810 =b%
5820 :
5830 DEFFNfile
5840 LOCAL b$,b%
5850 b$=GET$# in%
5860 IF INSTR(b$,":")>0 AND INSTR(b$,":")<12 THEN
5870 b%=FALSE
5880 ELSE
5890 b%=TRUE
5900 ENDIF
5910 PTR# in%=0
5920 =b%
5930 :
5940 DEFFNget_type
5950 LOCAL b$,b%
5960 b$=GET$# in%
5970 IF INSTR(b$,CHR$(9)) THEN
5980 b%=&6a5
5990 ELSE
6000 b%=&fff
6010 ENDIF
6020 PTR# in%=0
6030 =b%
6040 :
```

PIECES OF EIGHT

Listing 1

```
10 REM Three Dee Shades
20 REM by Peter Voke
30 REM B/B+/M/C/E
40 REM (c) BBC Acorn User March 1991
50 :
60 ON ERROR MODE 6:PROCerr
70 DIM oscli% 40
80 REPEAT
90 MODE 6
100 PROCmenus
110 MODE 1
120 VDU 23;11;0;0;0;
130 HIMEM=&2F00
140 IF L% THEN PROCload
150 IF NOT M% THEN PROCcreate
160 PROCkeyin
170 UNTIL FALSE
180 :
190 DEF PROCmenus
200 VDU 19;4,0;0
210 *FX 225,48,0
220 PRINT'TAB(15)"THREE  DEE"
230 VDU 28,4,24,39,7
240 PRINT"1. Create Screen"'
250 PRINT"2. Inspect Screen"'
260 Q%=FNin("Select 1 or 2",1,2)
270 M%=(Q%=2)
280 IF M% THEN PROCfile:ENDPROC
290 C%=1:D%=4:E%=6:F%=0
300 CLS
310 A%=FNin("Fineness (1-8)",1,8)*4
320 B=FNin("Scatter (0-10)",0,10)/10
330 S%=FNin("Scale (10-100)",10,100)*5
340 H%=FNin("X shift (-125-125)",-125,125)*5+640
350 G%=FNin("Y shift (-100-100)",-100,100)*5+512
360 CLS
370 PRINT"1. R is a function of Y"'
380 PRINT"2. R-squared is a function of Y"'
390 PRINT"3. R-inverse is a function of Y"''
400 Q%=FNin("Select 1, 2 or 3",1,3)
410 IF Q%=1 THEN PRINT'"  R";
420 IF Q%=2 THEN PRINT'"R^2";
430 IF Q%=3 THEN PRINT'"1/R";
440 INPUT" =      "C0
450 INPUT"    + Y x "C1
460 INPUT"  + Y^2 x "C2
470 INPUT"  + Y^3 x "C3
480 INPUT"  + Y^4 x "C4
490 INPUT'"Preload file:"L$
500 L%=(L$<>"")
510 ENDPROC
520 :
530 DEF FNin(I$,U%,V%)
540 REPEAT
550 PRINT" "I$;TAB(22);
560 INPUT": "W%
570 IF W%<U% OR W%>V% THEN VDU 7
580 UNTIL W%>=U% AND W%<=V%
590 =W%
600 :
610 DEF PROCcreate
620 PROCvdu
630 Y%=-S%-A%
640 r=0
650 PROCrad
660 PROCrad
670 FOR Y%=-S% TO S% STEP A%
680 PROCrad
690 rs=R%*R%
700 FOR X%=-R% TO R% STEP A%
710 gx%=2.5+(RND(1)-0.5)*B+(X%+SQR(rs-X%*X%)+v)*h
720 GCOL 0,gx%
730 PLOT 69,X%+H%,Y%+G%
740 NEXT:NEXT
750 VDU 7:ENDPROC
760 :
770 DEF PROCkeyin
780 REPEAT
790 key=GET
800 IF key=83 THEN PROCsave
810 IF key=49 THEN C%=(C%+1) MOD 8
820 IF key=50 THEN D%=(D%+1) MOD 8
830 IF key=51 THEN E%=(E%+1) MOD 8
840 IF key=48 THEN F%=(F%+1) MOD 8
850 PROCvdu
860 UNTIL key=67 OR key=83
870 ENDPROC
880 :
890 DEF PROCsave
900 ?&2FFC=C%:?&2FFD=D%
910 ?&2FFE=E%:?&2FFF=F%
920 *SAVE SCREEN FFFF2FFC FFFF8000
930 ENDPROC
940 :
950 DEF PROCload
960 PROCoscli("LOAD "+L$+" FFFF2FFC")
970 C%=?&2FFC:D%=?&2FFD
980 E%=?&2FFE:F%=?&2FFF
990 PROCvdu
```

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◀ **Continued**

```
1000 ENDPROC
1010 :
1020 DEF PROCrad
1030 oldr=r
1040 y=Y%/S%
1050 r=(((C4*y+C3)*y+C2)*y+C1)*y+C0
1060 r=ABSr+1E-6
1070 IF Q%=2 THEN r=SQRr+1E-6
1080 IF Q%=3 THEN r=1.0/r
1090 IF r<-1 THEN r=-1
1100 IF r>1 THEN r=1
1110 r=r*S%
1120 h=SIN(ATN((r-oldr)/A%)+PI/2.0)/r
1130 v=COS(ATN((r-oldr)/A%)+PI/2.0)/h
1140 h=h/1.732
1150 R%=r
1160 ENDPROC
1170 :
1180 DEF PROCfile
1190 CLS
1200 REPEAT
1210 VDU 26:CLS:*CAT
1220 INPUT'"Enter name of screen file :
"L$
1230 UNTIL LEN(L$)>0
1240 L%=TRUE:M%=TRUE
1250 ENDPROC
1260 :
1270 DEF PROCvdu
1280 VDU 19,1,C%;0;19,2,D%;0;
1290 VDU 19,3,E%;0;19,0,F%;0;
1300 ENDPROC
1310 :
1320 DEF PROCoscli($oscli%)
1330 X%=oscli%:Y%=oscli% DIV 256
1340 CALL &FFF7:ENDPROC
1350 :
1360 DEF PROCerr
1370 REPORT:PRINT" at line ";ERL''
1380 PRINT"Press Q to quit or any other
key"'"to continue."
1390 *FX 15,1
1400 key=GET OR 32
1410 IF key<>ASC"q" RUN
1420 CLS:END
```

Listing 2

```
10 REM Maths In Motion
20 REM by Michael St Aubyn
30 REM for B/B+/M/C/E
40 REM (c) BBC Acorn User March 1991
50 :
60 MODE4:VDU23;8202;0;0;0;
70 code=&5100
80 xwave=&5200:ywave=&5300
90 lostore=&5400:histore=&5500
100 bytestore=&5600
110 *KEY0 RUN|M
120 *KEY10 OLD|MLIST,560|M
130 VDU23,1,0;0;0;0;
140 PROCzeropage
150 PROCassemble
160 PROCinitialise
170 PROCstore
180 *FX 4,1
190 *FX 15,1
200 ON ERROR
210 :
220 REPEAT
230 *FX 12
240 FOR A%=0 TO &FF STEP 4
250 A%!histore=-1:NEXT A%
260 CLS:CALL code
270 PRINTTAB(00,31)"X frequency=";
280 PRINT;?xinc+256*(?xinc>127);
290 PRINTTAB(23,31)"Y frequency=";
300 PRINT;?yinc+256*(?yinc>127);
310 *FX 11
320 REPEAT UNTIL NOT INKEY-99
330 *FX 15,1
340 anykey=GET
350 UNTIL FALSE
360 END
370 :
380 DEF PROCinitialise
390 max=2*PI
400 PRINTTAB(3,10)"Initialising tables
- please wait"TAB(12,12)"Counting..."
410 FOR A%=0 TO 255
420 PRINTTAB(23,12);255-A%;"  "
430 a=max*A%/255
440 x=(SINa)^3
450 A%?xwave=x*127+128
460 y=x
470 A%?ywave=y*127+128
480 NEXT A%
490 xfreq=2:yfreq=-2
500 xspeed=1:yspeed=1
510 phasediff=0
520 ENDPROC
530  :
540 DEF PROCstore
550 bytedata!0=&10204080
560 bytedata!4=&01020408
570 ?xstart=0:?ystart=phasediff
580 ?xstartinc=xspeed
590 ?ystartinc=yspeed
600 ?xinc=xfreq:?yinc=yfreq
610 ?firstxinc=xfreq
620 ?firstyinc=yfreq
630 ?storeindex=0
640 ENDPROC
650 :
660 DEF PROCassemble
670 FOR pass=0 TO 2 STEP 2
680 P%=code
690 [OPT pass
700 \ change X & Y start positions
710 LDA xstart
720 CLC
730 ADC xstartinc
740 STA xstart
750 STA xindex
760 LDA ystart
770 CLC
780 ADC ystartinc
790 STA ystart
800 STA yindex
810 .loop
820 \ rub out old pixel
830 LDX storeindex
840 LDY #0
850 LDA lostore,X
860 STA addr
870 LDA histore,X
880 STA addr+1
890 LDA bytestore,X
900 EOR (addr),Y
910 STA (addr),Y
920 \ find address of new pixel
930 LDA #32*4
940 STA addr
950 LDY yindex
960 LDA ywave,Y
970 TAY
980 LSR A
990 LSR A
1000 LSR A
1010 STA addr+1
1020 LSR A
1030 ROR addr
1040 LSR A
1050 ROR addr
1060 ADC addr+1
1070 TAX
1080 TYA
1090 AND #7
1100 ADC addr
1110 STA addr
1120 BCC addx
1130 INX
1140 CLC
1150 .addx
1160 LDY xindex
1170 LDA xwave,Y
1180 LDY storeindex
1190 AND #&F8
1200 ADC addr
1210 STA addr
1220 STA lostore,Y
1230 TXA
1240 ADC #&58
1250 STA addr+1
1260 STA histore,Y
1270 \ draw new pixel
1280 LDX xindex
1290 LDA xwave,X
1300 AND #7
1310 TAX
1320 LDA bytedata,X
1330 STA bytestore,Y
1340 LDY #0
1350 ORA (addr),Y
1360 CMP (addr),Y
1370 BNE pixeldraw
1380 LDY storeindex
1390 LDA #&FF
1400 STA histore,Y
1410 BNE drawn
1420 .pixeldraw
1430 STA (addr),Y
1440 .drawn
1450 \ change X & Y indices
1460 LDA xindex
1470 CLC
1480 ADC xinc
1490 STA xindex
1500 LDA yindex
1510 CLC
1520 ADC yinc
1530 STA yindex
1540 DEC storeindex
1550 BEQ keys
1560 JMP loop
1570 \ check keyboard input
1580 .keys
1590 LDX #0
1600 LDY #0
1610 LDA #129
1620 JSR &FFF4
1630 CPY #&1B
1640 BNE space
1650 LDA #126
1660 JSR &FFF4
1670 .space
1680 CPX #32
1690 BNE left
1700 RTS
1710 .left
1720 CPX #136
1730 BNE right
1740 DEC xinc
1750 .right
1760 CPX #137
1770 BNE down
1780 INC xinc
1790 .down
1800 CPX #138
1810 BNE up
1820 DEC yinc
1830 .up
1840 CPX #139
1850 BNE return
1860 INC yinc
1870 .return
1880 CPX #13
1890 BNE codejump
1900 LDA firstxinc
1910 STA xinc
1920 LDA firstyinc
1930 STA yinc
1940 .codejump
1950 JMP code
1960 ]
1970 NEXT pass
1980 :
1990 REM Checksum
2000 total%=0
2010 FOR byte%=code TO (P%-1)
2020 total%=total%+?byte%:NEXT byte%
2030 IF total%<>24907 PRINT"Checksum er
ror - please check listing":END
2040 :
2050 ENDPROC
2060 :
2070 DEF PROCzeropage
2080 xstart=&70:ystart=&71
2090 xstartinc=&72:ystartinc=&73
2100 xindex=&74:yindex=&75
2110 xinc=&76:yinc=&77
2120 firstxinc=&78:firstyinc=&79
2130 addr=&7A:storeindex=&7C
2140 bytedata=&7D
2150 ENDPROC
```

NOTES

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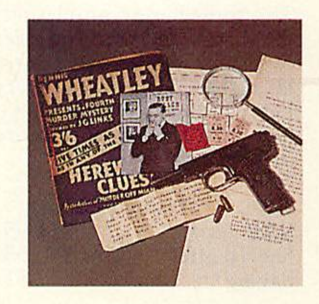


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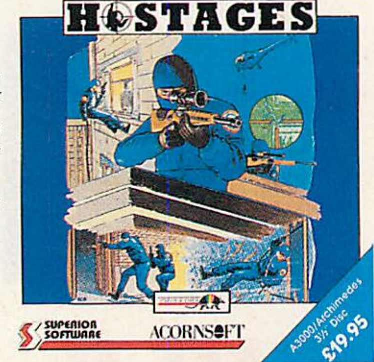
GAMES

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RRP	£14.95	RRP	£18.95	RRP	£12.95
Special offer	£13.95	Special offer	£17.95	Special offer	£11.95
Saving	£1	Saving	£1	Saving	£1

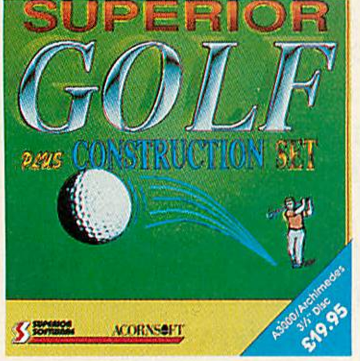
Hostages



You are the head of the Terrorist Combat Squad. An urgent call comes from the Minister for National Security. An embassy has been overrun by terrorists, and you've been put in charge of all operations. Your first priority is to place all your crack hitmen in strategic positions throughout the neighbourhood, without getting themselves shot. You then have to get your team of specialist paratroopers into the embassy and save the hostages without any loss of life. There are many potential death traps to trick you — these terrorists are no pushover! The pressure is on . . . and it's your move.

A3000/Archimedes

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		Saving	£2



Superior Golf

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When you've mastered the sport of golf, you can design and construct your own holes and courses with the easy-to-use, but very powerful, Hole Editor and Course Editor. Then you can enjoy playing a round on your very own masterpiece.

A3000/Archimedes

RRP	£19.95	Special offer	£17.95	Saving	£2

Play it again Sam 13



This four-game compilation from Superior has yet another collection of excellent games to get the year off to a cracking start. Barbarian 2 is a game of skill and strategy and your objective is to overcome the gruesome monsters. For classic fans, there's an exciting 'bat n' ball' clone – Hyperball. Of course, everyone loves Percy Penguin, a classic and highly addictive game. Percy must kill the Snobees by hurling ice cubes at them. And Pandemonium breaks out when you try to construct the core against all odds. Intrigued? This compilation is a must for your collection.

BBC B/Master (5.25in)		BBC B/Master (3.5in)		Electron cassette	
RRP	£11.95	RRP	£14.95	RRP	£9.95
Special offer	£10.95	Special offer	£13.95	Special offer	£8.95
Saving	£1	Saving	£1	Saving	£1



Play it again Sam 14

Another in this series of games anthologies, this is the very latest from Superior. You've seen the movie . . . now play the game! Play your part as Schwarzenegger the Predator, fighting through the South American jungle. But, beware the lurking alien. Ballistix is a different kind of ball game. And you don't have to play alone. Have the neighbours around for a league competition, and see whose yard the ball finally falls in. And speaking of balls, Superior Soccer is pitched in to this best yet PIAS. Star Port completes the ensemble. It's a brand new arcade adventure that will transport you into space to save the station's medical supplies.
To become a hero though, you need to first look at page 108, and order your copy of Play it again Sam 14.

BBC B/Master (5.25in)		BBC B/Master (3.5in)		Electron cassette	
RRP	£11.95	RRP	£14.95	RRP	£9.95
Special offer	£10.95	Special offer	£13.95	Special offer	£8.95
Saving	£1	Saving	£1	Saving	£1

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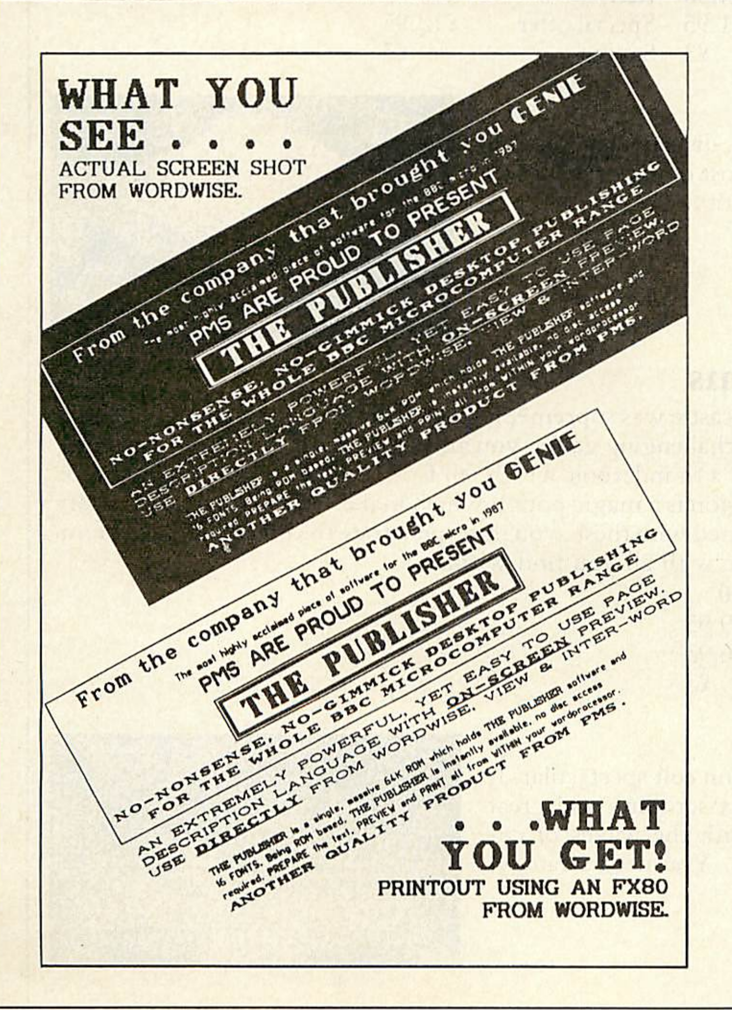
DESIGN

BAU is pleased to offer its readers a great multi-tasking 3D graphics and animation system for the A3000/Archimedes

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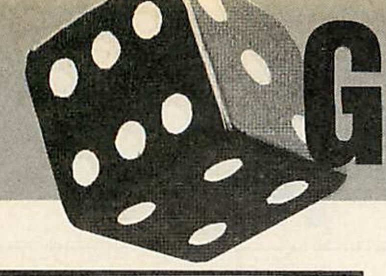
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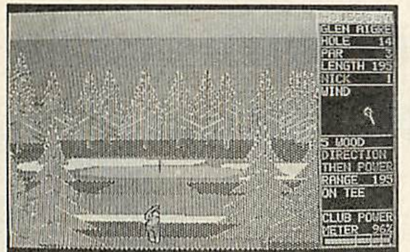
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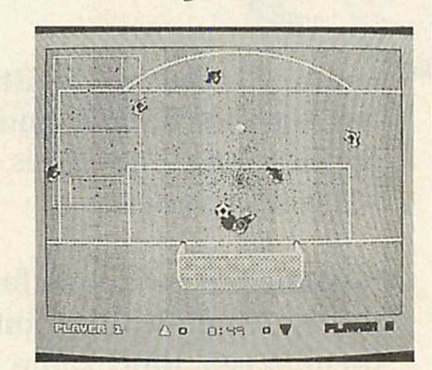
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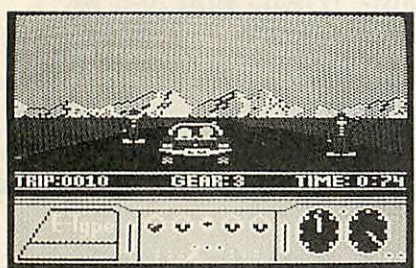
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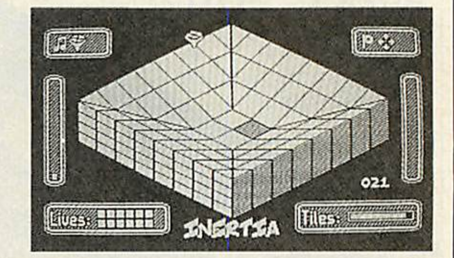


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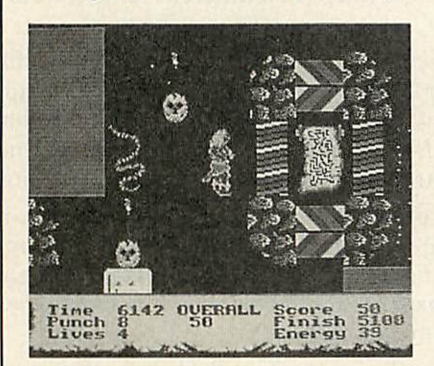
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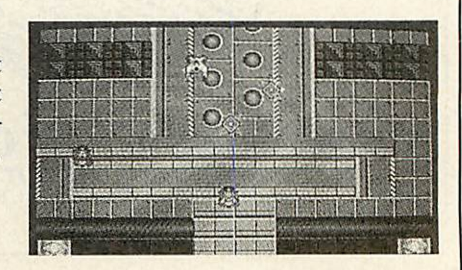


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Illustration by Gary Powell

WORLD IN ACTION

SAM GREENHILL, fed up with London and the world, finds two simulations that enable him to create his own environment

Eighteen months ago in August 1989, a special paper was drawn up for the Urban and Regional Information Systems Association (URISA) conference in the United States. The paper was about an Amiga computer game called *Sim City*: what it is, how it works and how it could be used to make money.

Sim City is, in a nutshell, a game which simulates the growth or decline of a piece of urban land. The player, as mayor, can alter variables such as the tax rate or the police and fire department's budgets, and as chief planner may – among other things – build roads or power stations, and designate areas of land for residential or industrial development.

The computer, meanwhile, is busy with a set of algorithms which determine how successfully the arrangement works as a city. It takes account of population density, electricity supplies, unemployment and the effectiveness of the road network. If the result is positive the city will become popular and people will come to live there. The tax money collected will rise and this will enable you to expand. And so it goes on.

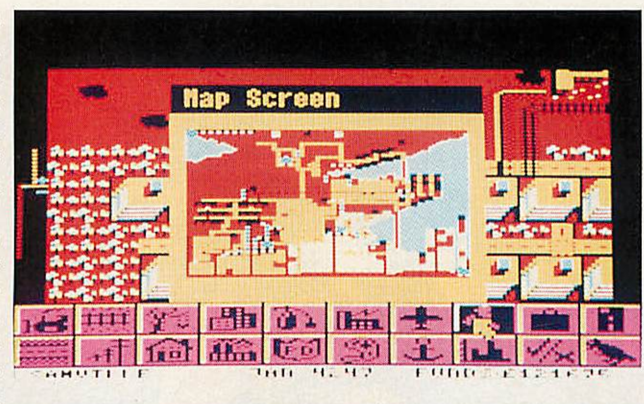
The game was conceived by Will Wright, an American who studied a lot of real town statistics before formulating the algorithms for *Sim City*.

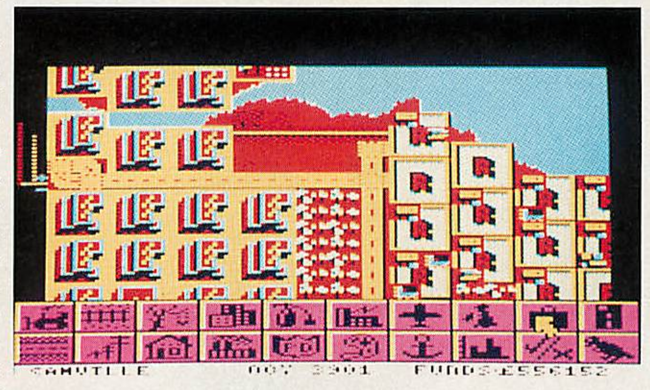
Just as pilots spend many hours in a flight simulator before welcoming passengers on board (at least I hope they do), the paper presented to the URISA conference embodied a similar idea for town planners – they could perfect their theories on the computer simulation before wrecking any real towns (or something like that).

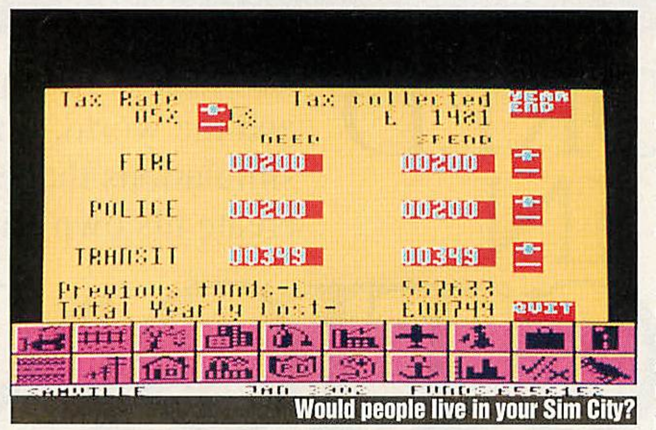
It is an idea that has been taken on a much grander scale by a British software company called Eclipse. It has just finished a game on the Archimedes called *Worldscape*, which, in a broad sense, simulates natural development on a global basis, taking into consideration the effect of cities, power stations and even rainforests, then calculating the impression on the ozone layer and global temperature. I shall talk more about *Worldscape* later, but first, after four years, *Sim City* is now available for the BBC micro: how does it fare?

To begin with, the player is presented with an empty red desert, a few miles of rugged coast, and $20,000. At the base of the screen lies a panel of 20 icons, six for the budding mayor in you and 14 for the aspiring town planner. Your 20 grand begins to disappear fast as the essential

power station (coal or nuclear) is installed, a local grid set up, police and fire stations built and a road network begun. Placing residential zones near the coast boosts house prices and hence taxes collected. The people living in the houses are called 'Sims' and it's darn hard to keep them happy. The areas of residence must be placed away from factories but close to the coast and park land. The Sims want roads to take them to work and generous protection against fire and crime. In short, they want blood.







Would people live in your Sim City?

Once the vital foundations have been laid, the village can begin to develop. The important thing to remember about *Sim City* is that it is the Sims who do the developing – your job is merely to provide acceptable conditions for the Sims to live and work. As the Sim clock ticks the months away, residential zones change from ad hoc buildings to high rise flats, and industrial zones grow from small pumping stations to large plants. As the city expands, it develops an appetite for commercial zoning, which contain offices, shops and supermarkets. A large city will need an airport, docks and several large stadiums.

I discovered the best strategy for playing *Sim City* quite accidentally. I built up a small village consisting of several residential and industrial zones, a few park areas and a couple of police and fire stations, then left it running overnight. As luck would have it the night passed peacefully, devoid of any earthquakes, tornados or large monsters. Also rather luckily, a group of obliging rich suckers chose to take up residence during the night and regarded my steep 20 percent tax rate with uncritical acceptance. Whether they naively believed that their wealth was in good hands, or were merely gullible is beside the point – I made a fortune.

By way of thanks I bulldozed their houses, roads and places of work then cleared the land ready for my new mega city to be built, and with a budget of over $600,000.

This cunning strategy was recognised by Superior at an early stage as something of a bug in the 16-bit versions of *Sim City*, so the BBC game has found itself managing both the city and 'the disaster phenomenon': a 1/256 chance of an earthquake each year. The purpose of this is specifically to keep the mayor on the job with an eye on the figures. If left overnight, your city is bound to be full of holes by the morning. Personally I find this annoying, but Superior's justification is fair enough so I won't make a fuss. It is possible to test your ability to deal with a disaster before it actually occurs – there is a short menu with three options: earthquake, tornado or a 'Godzilla'-type monster which bounces on top of the city with a big grin! Morale is next to nothing and every graph in sight is one big negative for about 10 years following a disaster.

There are several special screens available to the mayor. The budget screen pops up every year to deliver the important news: profit or loss? It calculates the cost of all the police and fire stations, the price of long stretches of roads and railways, then combines the population and tax rate to show how much money the city earned in the past year. The budget screen provides facilities for adjusting the tax rate and money spent on transit and emergency services. Unfortunately, on the humble BBC, a large city can take up to 10 seconds to calculate everything, and it can be irritating to suddenly jump to it when you're half way through a construction operation.

The map screen shows a map of the whole city and graphically indicates areas well covered by the police and fire services. On the evaluation screen, the all important population figure is revealed and some moans are voiced by the Sims. They tell you their most urgent problems – usually crime and the tax rate in Samville (my city). A percentage figure discloses the proportion of the city connected to power, though a graphical indication – as with the police and fire services – would have been better. As it stands, it is very difficult to know which areas are lacking power.

The graph icon provides an overview of progress – or lack of it – during the past 10 years. This is quite useful though sometimes confusing. Unemployment is always rock-bottom in Samville, but factors such as crime and popularity fluctuate, even when I do nothing for 10 years.

It took me several weeks to produce a city which had any hint of 'thrive' in it, and I almost gave up a couple of times. Samville is now technically a 'big city' boasting a population of 101,000 people. Samville Sims complain mostly about crime and for a long time I couldn't figure out why. Police stations can be easily sighted from almost any street corner in my town. Then I was advised by Superior that the cause of the problem was the lack of trees near residential zones! Apparently trees lower the crime rate because they reduce the population density. Ah well, you learn something new every day...

The tools available in *Sim City* are fairly limited; in other words you can't really do very much. In a real city, the mayor would commission construction work on the cheap, run morale boosting campaigns and use contacts in high places to influence the figures, though not that high – I mean there would still be earthquakes. The game's original author, Will Wright, admits: 'it is simplistic – we did not, for example, simulate variables on

literacy which would affect the crime. It is a general approach'. But this doesn't matter. You can do very complex things with *Sim City* and have a great deal of fun.

Not so *Worldscape*, the Archimedes game mentioned earlier. I have not had a great deal of fun playing it to date, though I can see that some people might. Its aim is to afford the player an opportunity to rectify world devastation. It focuses primarily on the ozone layer, pollution and the greenhouse effect. A clean world is presented to the new player; a planet with a perfect balance of nature. Unlike *Sim City* in which money dictates your every move, *Worldscape* has a power meter. Whenever you build anything, your power depletes. The speed at which power is restored is regulated by the game balance meter. This one is adversely affected by urban development and pollution – ie, the nasty things – but boosted up by rainforests and waste recycling plants.

The fresh planet provided with *Worldscape* is called Egonia though I changed mine to Napalm Sets (think about it). Icons are placed on the map with a pointer, as in *Sim City*. City blocks can be placed but 'grow' naturally if the conditions are good. Cities need pipes to connect with the sea, and these carry water to, and waste from, the buildings. A sewage plant carefully inserted between the city and the sea will help keep the game balance cheerful, and a water purification plant is necessary to make water pumped to cities any use.

The same sort of philosophy applies with power stations. Nuclear jobs require a re-processing plant for radioactive waste. When lacking, you've let yourself in for a hard time! Before building a power station it is a good idea to commission a seismic survey. This reveals the type of energy source likely to be found in the vicinity, and tells you whether a nuclear, coal or oil powered station would be the best investment.

The trouble is, power stations appear to be very weak and all too soon a city has expanded beyond a certain size causing sections to have blackouts. The only way to rectify the problem is to literally 'cut' the city in half by planting a rainforest down the middle and then build a second power station for the 'new' city!

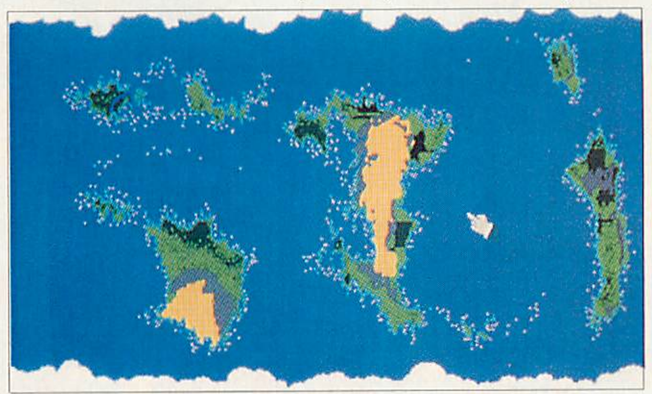
As with the evaluation screen in *Sim City*, there are several facilities for checking progress in *Worldscape*. An ozone layer information chart blasts pink squares at you which are supposed to correspond to the world map, and any dark area represents a dreaded hole. A set of line graphs show the changes in population, ozone coverage and global temperature over the past century but these are relatively unhelpful, particularly since the population line is well off the top of the chart and out of sight within the first thousand years.

And therein lies the fundamental problem with *Worldscape*. You build some cities, power stations and so on, hang around a few centuries, then check the ozone layer and global temperature charts. Lo and behold, every city has a hole above it, and the temperature has risen slightly. So? What are you supposed to do about it? The waste reprocessing plants already exist so there's no point in placing any more of those. Basically, that leaves the planting of more rainforests. There appears to be no other mechanism for dealing with the problems. In fact, all you can really do in Worldscape is build cities, watch the graphs and plant more trees. Then, after a couple of thousand years the oceans have eroded about 50 percent of the land and there's no more room to plant trees. That's it, end of game.

There are many other problems with *Worldscape*. For one thing it is slow. The scrolling apparatus is tedious and badly implemented, and there is a small map of the world at the base of the screen which takes ages to update – and *Worldscape* enjoys updating it as often as possible. Most operations can take about three seconds to execute and this translates to approximately 10 seconds to actually put something on the map, once scanning through the menus and selecting a block has been done.

It can be quite fun placing cities and building little communities, but *Worldscape* is chiefly concerned with the natural development process. I think it would've been more fun if communication links could be set up, shipping routes planned and generally the commercial and industrial side dealt with, as with *Sim City*. *Worldscape* seems a bit too serious.

I envisage that *Worldscape* will be of limited educational use, though to be fair I speak as the game player rather than the teacher. I suppose it could be used to teach children about the concepts of conservation and world devastation, but there are too few tools available in the game for it to bear any true resemblance to possible solutions we could use to solve the current problem with the planet Earth today.





Power is paramount in Worldscape

As a game, *Worldscape* quickly becomes boring. I was really enthusiastic to begin with and was quite disappointed to find my powers are so limited. It is almost as though the game has only been half completed.

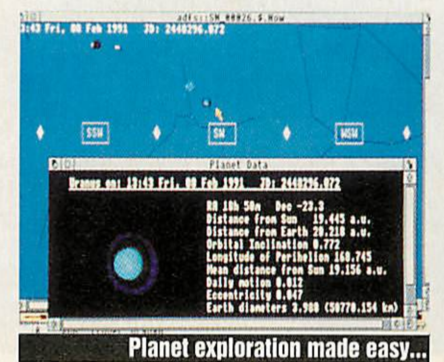
BBC micro owners I urge you to gets your hands on a copy of *Sim City* pronto. It is by far the best game since *Exile*. Archimedes people, you have a slight problem. If you're desperate, buy *Worldscape* – I'm not saying you won't like it, just that I don't – alternatively hang onto your cash. Will Wright is currently working on a *Sim Planet* and also a *Sim Evolution*! He is also considering an urban model of *Sim City* based on a non-market driven economy, possibly a communist or third world country. And finally the possibility of an Archimedes *Sim City* is a real one. Meanwhile, Ar'ma headed back to Samville!

Sim City *costs £14.95 and is available from Superior Software, Dept M1, PO Box 6, Brigg, South Humberside DN20 9NH.* Worldscape *costs £19.95 and is available from Eclipse, Burcott Manor, Wells, Somerset BA5 1NH.*

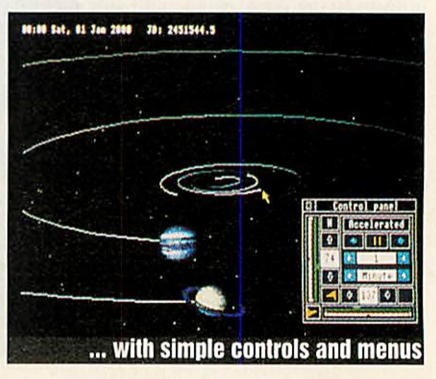
FINAL FRON

!Orrery is a new program enabling the Arc to explore our solar system. **FIN FAHEY** takes a celestial journey

Illustration by David Wood



Planet exploration made easy...



... with simple controls and menus

TIERS

Thinking about the scale of our universe can often be enough to make a person recoil in bafflement. How do you come to terms with objects like the distant quasars, 13 billion or more light years away?

!Orrery from Spacetech is aimed at promoting understanding of one minute corner of this vastness – our own solar system. The original orrery was an intricate construction of steel and brass, powered by clockwork, invented in the 18th century. Elaborate gearing rotated little balls representing the planets around the Sun at the centre, maintaining the correct ratios for each planet's 'year'.

Orreries became ever more complex and accurate, including such refinements as the satellites of Jupiter. In some ways, these devices were early analogue computers.

Spacetech's *!Orrery* achieves the same effect, but with incomparably more accuracy, using the Archimedes. It models the paths of the nine known planets, the Sun and our Moon, for any date and time, and can show their positions against the stars.

Getting into *!Orrery* is very simple – it's an icon-controlled Risc OS program, complete with preset setup files which can be used to generate particular views with no fiddling around.

There are two ways of looking at the solar system, and *!Orrery* covers them both. We normally look at the sky from our Earth, deep inside the system – a geocentric viewpoint. Traditional orreries allowed the system to be seen from outside – heliocentricity – and this is the first type of view that *!Orrery* shows. Indeed, the intro screen selects the only view we have of the whole solar system from outside, which was taken by Voyager 2 in September 1989.

Individual planets themselves are depicted as digitised images taken from various space probes – mostly Voyager again. They can be shown to scale, according to either your closeness to them, or by their relative sizes. The system may be viewed from any angle, so that you can move out of the ecliptic (the plane of the system) and view the orbits of the planets from 'above' or see things from edge on. If you wish to focus on the planets alone, the starry background may be turned off.

This program is more than a static display, however. From a given starting time, you can run the planets in their courses backwards or forwards. This would be tedious in real time, but the Accelerated time option allows you to speed things up. At a month a frame, things start to zoom along nicely. To help you to understand the differing orbital motions, each world can be made to leave a track of its orbit behind.

The orbits in *!Orrery* are to scale, which means that it's very hard to see the inner worlds – Earth among them – from beyond the orbit of Pluto. A Zoom option, however, solves this problem. Another useful option means that clicking on any planet or star brings up a window with extra information on that body.

Down to Earth

Having tasted the heady joys of interplanetary space, it's reassuring to find that *!Orrery* can cope with the view from a suburban back garden. All you have to do is provide the program with your latitude, longitude, and the time (it will take the current time from the system clock if you wish) and select the geocentric option. By using a couple of slider controls, you can scroll around the sky from north to south, and from east to west.

For added realism, you can turn on atmospheric effects, which means that you see nothing but blue sky if the sun is high, but as twilight sets in, the stars and planets gradually emerge from a darkening sky. Unlike in the heliocentric view, the Moon image now shows its different phases.

Once again, accelerated time can be used to speed up the planets, and Spacetech has added a nice extra touch by also including the 'precession of the equinoxes'. Due to precession, the Earth's rotational axis sweeps out a cone over the centuries, which means that the poles do not point at the same star all the time, but describe a circle in the heavens.

Our current north pole star, for example, is Polaris in Ursa Minor, but for the ancient Egyptians it was Thuban in Draco. The program shows exactly this if you set it for around 2000 BC. It's quite fascinating to speed up the program and watch the poles rotate around the sky, taking in different stars for different dates.

Although *!Orrery* is aimed at showing the solar system, it can also be used to display the constellations. Stars of brightness down to a magnitude of around three are included, which is enough to show the outlines of the major star groupings, and there's an option which displays the outline of the groups in the heavens.

You can change the appearance of maps in a number of ways. These include turning the horizon on and off, making the map occupy the whole screen, or changing the colour of the constellations. More importantly, maps can be sent to the printer for later perusal, or saved as drawfiles or sprites.

Given the timely introduction of astronomy on the National Curriculum, *!Orrery* is an ideal introduction to the solar system. It looks stunning, and runs fast enough on a 440 to give a feel for the relative motions of the planets, although it's at its best on the 540. Its simple and consistent controls and menus means that this is educational software at its best.

Amateur astronomers will enjoy the program, but probably find it of limited use, since most are by and large concerned with observing stars, not the planets, and are concerned with small fields of stars, especially when observing variables.

It's no great criticism, but I wished for a few additions. Some asteroids to fill that yawning gap between Mars and Jupiter, a few token comets to give users a feel for their strange elongated orbits, perhaps the main satellites of Jupiter (why should Earth be the only planet with a satellite) – the list is long. No matter – I'm sure Spacetech is already contemplating the possibilities of enhancement.

Few things can excite the imagination more than gazing at the stillness of the real sky on a clear night. *!Orrery* offers a complementary view by depicting how the planets whirl in their celestial dance.

!Orrery *costs £95 and is available from Spacetech, 21 West Pools, Portland, Dorset DT5 2EA.*

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TRACE ELEMENT

If you want to convert sprite files to fully readable drawfiles, Midnight Tracer is for you. DAVE LAWRENCE has been trying it out

There are two ways of storing graphics within a computer. You can either use an application like *!Paint* and set the colour of individual pixels and create a bitmap image (a sprite), or you can use *!Draw* and manipulate the location and style of lines and points to come up with a vector image (a drawfile).

Both these methods have pros and cons. Sprites are easy (and quick) to plot on the Archimedes, as the screen is memory mapped and the actual picture displayed on the monitor is generated by a raster scan. Unfortunately they are not so easy to rescale or rotate – it is often very tricky to retain detail when rescaling and rotating often produces very uneven and jagged results.

On the other hand, drawfiles can be rotated and rescaled as much as you like and the resulting image retains all its detail. This has the added advantage that the printer drivers can use the resolution of your printer and produce hard copies of the image with smooth edges – try dumping a monochrome sprite and you'll probably end up with some very nasty looking edges!

The main problem with drawfiles? They are quite tricky (and slow) to render, especially when they contain a number of thick-lined, filled-in Bezier curves.

In most cases it is obvious when to use a sprite and when to use a drawfile – but there are times when it would be nice to convert an image in one form to the other. Imagine you've just had a logo designed for your company – you could first scan the image and produce a sprite, tidy up any glitches with *!Paint* and print the result.

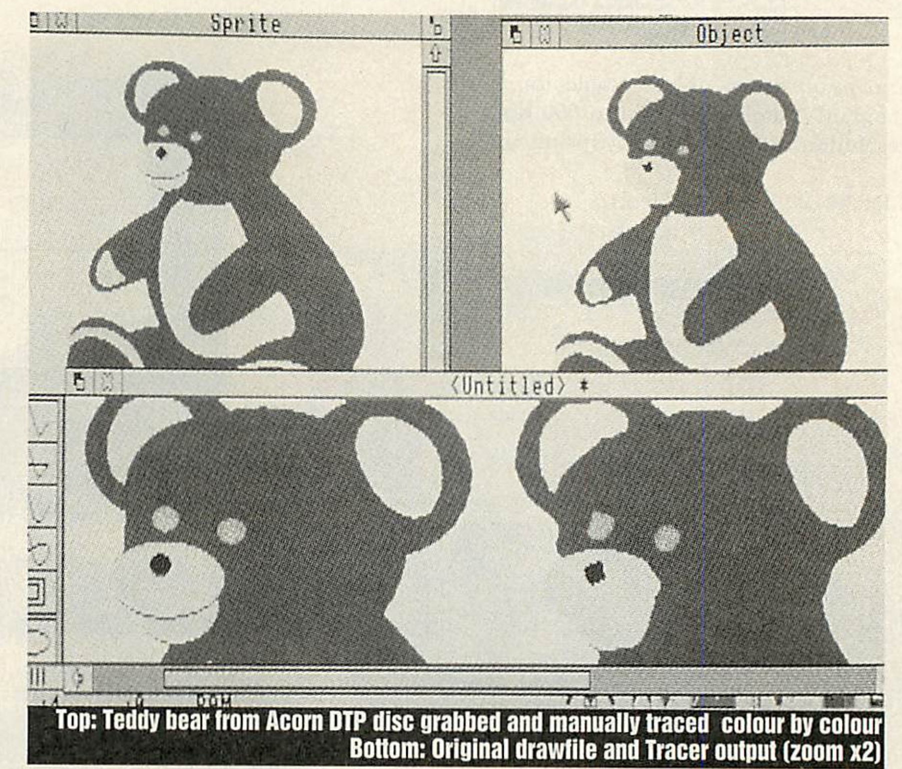
Wouldn't it be nice if you could transform this sprite into a drawfile so you could enlarge it to produce a poster without those nasty edges? Well, now you can, with the help of Dabhand Computing's *Midnight Tracer*.

Tracer in action

Tracer comes supplied as a single application on a disc. It is written entirely in Arm code, so it runs super fast and there's no C Library to load, so it uses very little disc space! Once installed on the icon bar (in the usual Risc OS way) any sprite files dropped on its icon or in any of its windows are immediately displayed in the Sprite window. A second Object window is also displayed, exactly the same size as the Sprite window, but empty for now.

To trace the sprite, simply click in the Sprite window with the Select button on the mouse. After a few seconds, the resulting drawfile will be drawn in the Object window.

The drawfile can be saved either by clicking the menu button over the object window, or from the *Tracer* icon on the icon bar. If you load this file into *!Draw* you will indeed see that the image is now stored as a series of lines with Bezier curves.



Top: Teddy bear from Acorn DTP disc grabbed and manually traced colour by colour
Bottom: Original drawfile and Tracer output (zoom x2)

Trace options

For £60 I'd expect a menu with lots of things to twiddle, and *Tracer* doesn't let you down here. Clicking Menu over the Sprite window gives you access to the sprite and trace options that allow you to tweak the performance of the package.

The Trace Options submenu lets you adjust the four parameters used by the tracing algorithm. Fiddling with these basically changes the coarseness and level of detail present in the resulting image. The first control, Sample, allows you to change the

number of pixels examined before a change of direction is registered – the higher the number, the larger the area examined, so a high number will make 'fuzzy' edges appear straight. However, it will make *Tracer* ignore any small details.

The next control, Close, represents the minimum distance between control points in the resulting image. Making this big will again tend to smooth out jagged or stepped edges but, as with Sample, it will largely gloss over any small details. The Smooth parameters determine the angle at which a control point changes from a corner to a curve. If two lines meet at an angle less than the Smooth value, a corner point is created rather than a control point on a Bezier curve. Different sprites will need different values for these parameters and it is really a matter of trial and error to find out what they should be for any particular image. Fiddling with them can greatly enhance (or degrade!) the results.

Tracer allows you to trace monochrome or colour images, but the latter have to be done 'manually'. Don't despair – this doesn't mean you have to do it yourself, instead you have to use the Sprite Options submenu to select which colours are displayed in the sprite window, select Manual from the Trace Options menu and then click on the areas in the sprite window that you wish to trace.

Automatic tracing can work out where the areas that should be traced are, but *Tracer* cannot do this with colour images. The sprite options also allow a very basic thresholding to be applied to images. This is mainly used for grey scaled images. A simple slider is provided that controls the cut-off value (0-255) between white and black pixels, the Clean button below the slider can then be used to tidy up any stray pixels.

Manual tracing can be very useful, even when automatic tracing is possible – in a complex image you can just tell *Tracer* which bits you want traced without loading the image into *!Paint* and removing the unwanted areas first. Menu options (and key short cuts) are conveniently provided for undoing mistakenly traced areas.

One final option allows you to join traced edges together with 'move' commands. This means that they can then be treated as one path by *!Draw*, etc, resulting in white 'holes' in the sprite remaining as 'holes' (and thus not being filled) in the drawfile.

What it can do

As you can clearly see from the examples on these pages, the results from *Tracer* can be really impressive. The unfortunate thing is that they can also be slightly disappointing – but don't be alarmed, I only thought this at first.

There is no way that *Tracer* can produce absolutely perfect results every time and so the way to look at the results is that it's amazing it does anything at all! It is very unlikely that any output from *Tracer* can be used immediately without first touching up manually in *!Draw* – but would you prefer to do a little tweaking of control points or trace the entire image yourself?

At the very worst, *Tracer* will provide you with a basis from which to work towards producing a final image.

The program does have its faults, some of which are cosmetic. For example, there is no 'scale view' on either the Sprite or Object window and the Trace Options can only be set by clicking on up and down arrows – you cannot type in values. Other quibbles are more functional, but could possibly be built into version 2.

The current algorithm is not particularly good at spotting corners or straight lines. Right angles are usually traced as a rather sweeping Bezier curve and near-horizontal straight lines appear as a series of small, stepped Beziers! These problems can be minimised by twiddling with the Trace Options, but normally at the expense of other wanted detail in the image. I would like to see some sort of user assistance in indicating obvious corners and lines before tracing starts.

It would be nice to auto-trace a grey scaled image without converting it to a pure black and white image – the grey pixels could then be taken into account when tracing. This would help alleviate some of the problems of tracing near horizontal lines.

The program will only trace outlines of shapes. It cannot, for example, see that a line is 'thin' and only produce a single line in the output – this can produce some very strange results if you're not expecting it. Likewise, thick lines are converted to their outlines rather than their centre lines and thickness. These are slightly unfair criticisms of *Tracer*, as the program isn't designed to do either of these, it's just that it would be nice if it did...

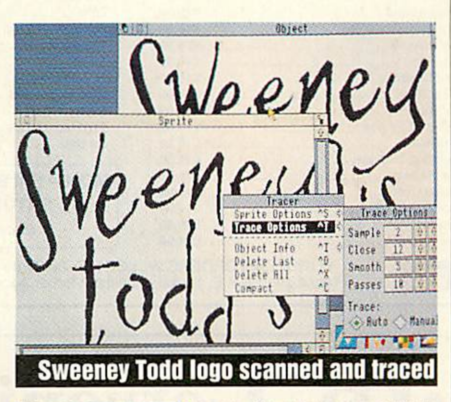
Conclusion

Unless you are amazingly adept with the mouse and *!Draw*, *Tracer* is indispensible for converting bitmaps to outlines. Once you've played around with the program for a while all sorts of applications spring to mind.

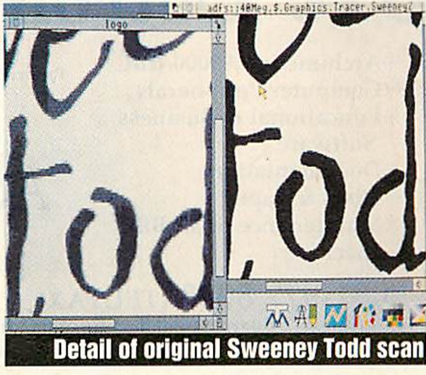
You could reproduce your company logo at any angle or size quickly and easily (see example). You could even scan some of your own handwriting and produce a Risc OS compatible font!

To sum up; a very good effort at tackling an exceedingly difficult problem.

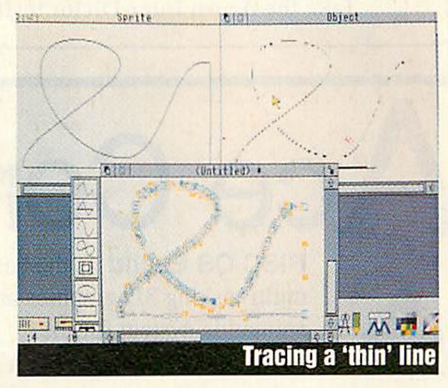
Many thanks to Sweeney Todd's Restaurant for letting me reproduce its logo as an example. Midnight Tracer *costs £52.13 and is available from: Dabhand Computing Ltd, 5 Victoria Lane, Whitefield, Manchester M25 6AL.*



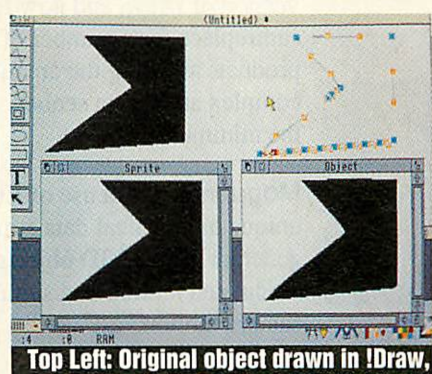
Sweeney Todd logo scanned and traced



Detail of original Sweeney Todd scan



Tracing a 'thin' line



Top Left: Original object drawn in !Draw, Bottom Left: Grabbed as a sprite and dropped into Tracer, Bottom Right: Output from Tracer, Top Right: Loaded back into draw with control points shown. Note the large number of curves along the bottom

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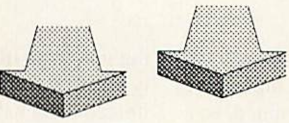
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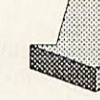
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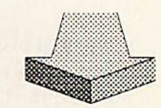


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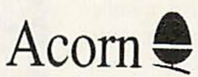
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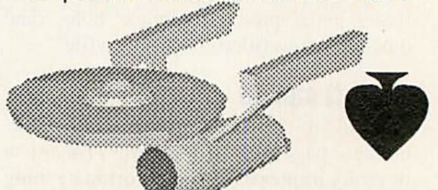
Tween produces films from Draw files. It uses techniques similar to **Mogul** and generates a film by calculating intermediate frames from a set of key positions.

Splice allows you to edit films produced by **Mogul** or **Tween**. You can even produce hand-drawn cartoons by converting sprites from any source.

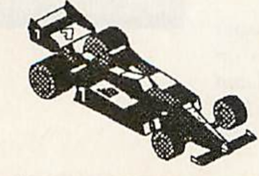
Support is provided for import and export of Sprites and Drawfiles. Films can be played by the **Projector** which comes free with **Euclid, Mogul, Splice and Tween.** Films and Euclid files can be used with Genesis.

Such is the enthusiasm for **Euclid** there is now a user group called **Elements** which provides a quarterly disk containing hints, tips, animations and user pictures like the ones in this advertisement.

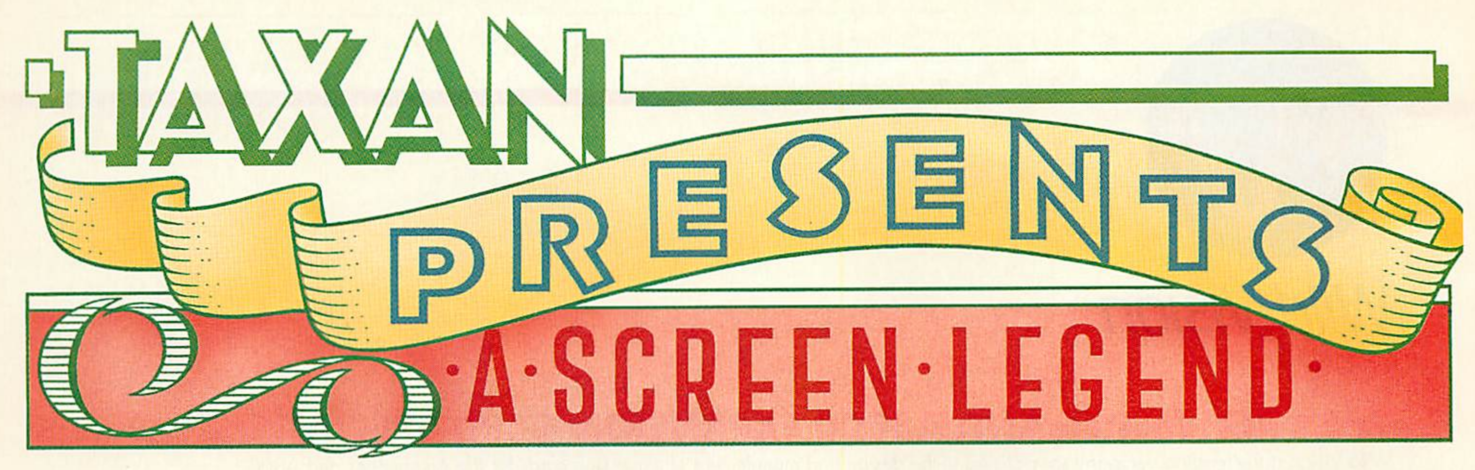
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SWEET INSPIRATION?

!Inspiration was intended to turn the interest of musicians towards the Archimedes. It was to be the first professional Midi sequencer for the world's fastest micro. How good is it? **ALAN WADE** reports

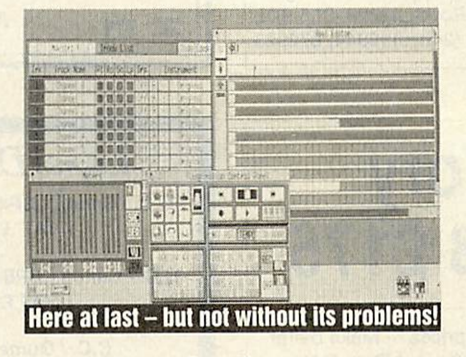
Of all the Archimedes products beset by problems, *!Inspiration* has had more than its fair share. Its development was announced over two years ago, previews were given over a year ago, it was advertised as being available at the beginning of last year and in the latter part of 1990, it finally went on sale.

Although *!Inspiration* will run on any Archimedes with 1Mb of Ram, you really need 2Mb-plus to make full use of all its facilities, and the Risc OS environment. You need an Acorn Midi interface (version 3.14 or later) or fully-compatible such as Pandora's own PM14. The latter has four Midi Outs which *!Inspiration* can address individually, thereby giving access to four x 16 or 64 separate Midi channels.

!Inspiration uses large windows, and in use you will generally need three or more active at the same time, so the higher the screen resolution, the easier the program will be to work with. Mode 16 is the most productive with a normal monitor and several alternate modes are supplied on disc for multisync users.

On activating *!Inspiration*, the first window to appear is the control panel, which contains tape recorder controls (play, record, fast forward, and so on) for moving through the music. There are Cue, Start and End indicators for marking positions in the music, a Position counter for telling you exactly where you are, and a SMPTE Time counter which provides timing information for professional use.

There may be a certain logic to it all, but a peculiar situation exists with regard to windows. Depending on where you click and with which button, you may do nothing, produce a window, a submenu or alter a value. It certainly doesn't make for fast familiarisation and I wonder if more standardisation might have been possible.



Here at last – but not without its problems!

Before recording, you must open the Reel Editor window. This is one of the big windows and is in two parts: on the left is the Track List and on the right is the Bar Editor. Unlock both sections so the Track List will stay on the screen even when you move the Bar Editor.

The Track List contains 11 columns for selecting options such as Play, Record, Solo and Loop. Tracks can be delayed, transposed, given a velocity offset (effectively making it louder or quieter) and assigned a Midi program change number, which will be transmitted prior to play.

The Track List can hold 256 Tracks, which is more than you'll ever need, but having many tracks is useful for holding alternative music lines.

The basic recording procedure is to select a track for recording in the Track List and click on Record in the control panel. The Midi menu lets you set up filter options to remove unwanted data from the recording, playback and Thru functions. Midi Thru sends data arriving at the Midi In socket back through the Midi Out so you can hear what you're playing on another instrument.

The Bar Editor displays the music in blocks, each representing a bar of music. The blocks may contain different colours depending on the type of data present in the bars. A Ruler above the display numbers the bars and the Cue points set in the control panel appear here.

Above the Ruler, another field is used

Illustration by Shaun Leckenby

for flagging Cue Points which are used to label sections of the music. Here the Cues appear fully written out and as you enter them they are added to the Cue Point window. The Cues can either be global or refer to individual tracks.

Clicking on a track with the Menu button produces a Track menu which includes save options and track information. You can Demix a track by channel, note or controller. Demixing by channel, for example, will split the track into separate tracks each containing data on just one Midi channel.

Each Track has its own Track Editor window, selected from the Reel Editor. These contain several sections, each displaying a different type of data. At the top is a Position Indicator which lists events by type and position. It shows notes, their names, velocities, Midi channel numbers and durations. Events cannot be edited here, however.

Below the Position Indicator is the Grid Editor in which notes are shown as bars on a grid. This is a quite a common method of note representation in sequencers and is helpful if you can't read music. Below this are four graphic editors which show mod wheel, pitch wheel, aftertouch and controller data in graphic form. Below these is a Patch editor for entering program change instructions.

As you may have realised, it's impossible for all these sections to appear on screen at once – but you can select the order in which they appear.

Notes can be selected for editing by rubber banding or by bar. They can be dragged to new positions and a Snap value ensures they fit into exact divisions of the beat. You can draw notes onto the grid, delete them and alter their duration. This is how music is entered in step-time, too.

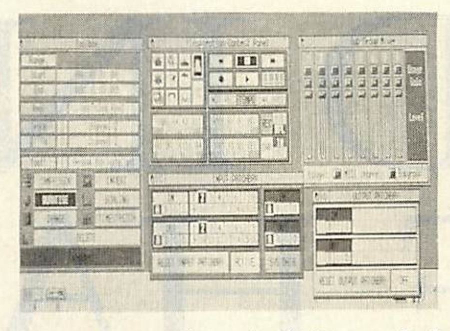
The graphic editors let you draw and edit data with the mouse so you can create data even if your musical equipment can't generate it.

Although editing is quite thorough, there are so many combinations and variations of buttons to press that anything but the simplest editing functions require a feat of memory.

It was at this point in my exploration of the program that I began to realise something was definitely not quite right. The program had already flagged several errors and while in the Track Editor it flagged several more – some which caused the machine to lock up or crash.

Most of the fatal errors were related to memory access problems, although there were some stack errors, too. As I was using a 4Mb machine, this really should not have been a problem.

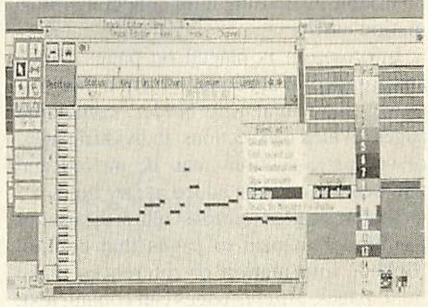
As I explored the other areas of the program, more bugs surfaced. Pandora



seems aware of most of them and, I believe, is working to correct them (the current version is 1.12), but I really think more time should have been spent debugging the program before releasing it.

However, once (or if) the bugs are removed, *!Inspiration* will have a lot of interesting features to offer the aspiring Archimedes musician. The Toolbox, for example, contains a set of seven tools for manipulating and directly altering Midi data: Compressor, Quantise, Change, Invert, Scaling, Timestretch and Delete.

The Compressor acts like a studio compressor and 'evens out' data which may



fluctuate over a wide range. Quantise is used to correct poor timing, adjusting the notes so they fall onto a predefined section of the beat.

Change is one of the most powerful tools as it can change one type of data into another and perform logical and mathematical functions on it. Invert will pivot a series of notes around a central point (making high notes low and vice versa) and it can reverse the order of notes in a track, enabling you to play them backwards!

Scaling can be used to create fade ins and outs and to make other smooth changes to data over a period of time. Timestretch fits a section of music into a given time period making it last for a longer or shorter time. Delete offers selective deletion of events.

As well as being incredibly powerful edit functions, these tools require a correspondingly sophisticated degree of understanding in order to use them effectively.

Another powerful feature is the Sub Group Mixer. This contains eight faders which can be assigned to an output bus and Midi controller. Moving the fader generates controller data which can be recorded into a track. This could be used with Midi volume control to produce fadeouts or to generate mod wheel, breath control or to sustain pedal data.

The Midi Input and Output Patchbays can remap data on one bus or Midi channel to another. One use for this would be to try music parts with different sounds. Suppose you have several sections of music playing on a zither which happens to be on Midi channel five and you want to hear what they would sound like on a Koto which is on channel 11. Instead of changing all channel five assignments within the program, just remap channel five to channel 11. A nice idea but altering the Patchbays during playback caused the program to lock up.

The final window, Meters, uses pseudo LED meters to indicate Midi activity on the 16 Midi channels.

One of *!Inspiration*'s most powerful and useful functions is Undo. Many sequencers have an Undo function which will reverse the last operation but *!Inspiration*'s Undo can, theoretically, undo all the way back to the beginning of a session, memory permitting.

Although no demo tunes were supplied with the program, *!Inspiration* can load *Maestro* files (the ability to save files in *Maestro* format has not yet been implemented). *!Inspiration* files are saved in Midi file format which should allow files to be swapped with other programs.

The manual is well produced and sprinkled with wry schoolboy humour. Unfortunately, it's more a list of functions than a tutorial, is rather short on illustrations and lacks an index. However, there is already a technical helpline in operation.

It's very difficult to sum up *!Inspiration*. On one hand it boasts a vast number of powerful and original features – more than we have room to list here – but the multitude of operational procedures, button presses and the variety of ways for selecting menus and edit options does not make for an really accessible front end.

It's difficult, if not impossible, to recommend this program in its present bugged state although, if you've been waiting two years for it you may be prepared to forgive it its indiscretions and accept updates and bug fixes as Pandora releases them (you must telephone the helpline for update news and send a formatted disc and SAE for the update).

!Inspiration *costs £299 and is produced by Pandora Technology Ltd., Hitcham Lodge, Taplow, Maidenhead, Berkshire, SL6 0HG. Send a formatted disc (format E) plus SAE to Pandora for a demo disc. Technical hotline, tel: 081-977 9164.*

BIRD IN THE HAND

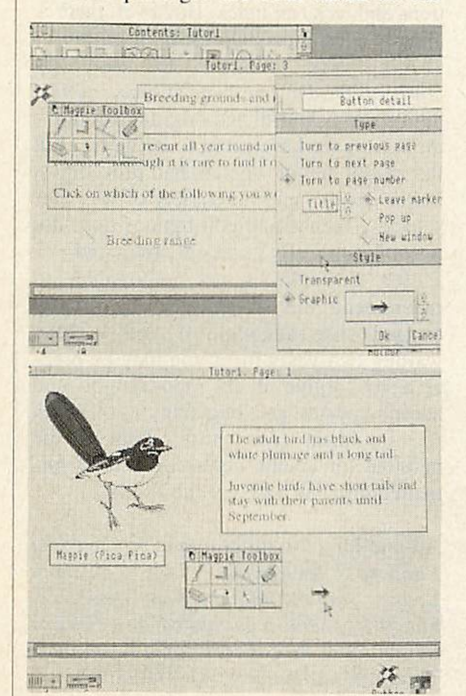
Why would you name a piece of educational software after a common British bird? DAVE FUTCHER dons his feathered cap and flies off to investigate further

A magpie is a bird which, apart from being a notorious predator of eggs and nestlings, is also attracted by bright objects. That is why educational software house, Longman Logotron, decided to call its new information package after these collectors of bright and varied bits and pieces in their nests.

What is *Magpie*? It's a totally open-ended application that provides an information environment for Archimedes and BBC A3000 users to use in whatever way they choose.

Not only can you choose what you store, but how each store is actually designed. The software is best described as a hypermedia system, which provides a framework for creating and accessing linked pages of information – rather like Oak Solutions' *Genesis*, or *Bookbinder* from Musbury Consultants.

These packages are both based on the ideas first developed by *HyperCard* on the Apple Macintosh. Unlike some of these packages, *Magpie* is very simple to use, but is no less powerful.



The author, Peter Cole, and Longman Logotron have developed a true Risc OS package that takes the fullest advantage of the Wimp environment. Users should have no trouble at all using it for collecting information easily.

Information is placed on pages which are grouped in sections to form a binder – rather like a real ring binder, containing pages divided into sections. Individual pages, or complete sections, can be moved and new sections can be added at any time.

Features called 'buttons' allow the user of the binder to turn to pages that contain 'linked' information or references. Like 'real' pages, *Magpie* pages can contain text, lines, boxes, pictures, and drawings, but they may also contain sound samples and music. The text can be displayed in a range of styles – fonts, sizes and colours.

The Archimedes outline fonts are supported, as is the computer's system font, and graphics in the form of drawfiles or sprite files can also be displayed.

Music files can be created with the *!Maestro* music editor or with *!Armadeus*, the Armadillo A448 sound sampler or the *Magpie* tape recorder. Whatever has been collected into *Magpie* can then be presented on screen for viewing.

In addition, as *Magpie* supports the Archimedes outline fonts and makes full use of the Risc OS printer drivers, pages can be printed for use as worksheets, pamphlets and even magazines.

Potential uses

To anyone involved in education and training the potential of *Magpie* is immediately obvious. It is an ideal tool for children and students to use for presenting work for a project – be it a record of an educational visit, a database about composers, or information about using craft tools.

Completed *Magpie* binders will be ideal resources for children to access. Similarly, binders could be developed by educational publishers as teaching resources.

Longman Logotron has realised the possibilities of the 'electronic book' and the package includes a tiny run-time version called *MagpiRead* which can be included with any files created with the package for free distribution. When you purchase the software you get two applications.

First is *Magpie* itself, an authoring package that gives you the ability to create your own pages and binders and the means to read them.

MagpiRead, then, is a browser that provides only the facilities for reading pages. Authoring your own material with *Magpie* is very simple thanks to the application's intuitive, easily learned, interface.

This means that the package can be used successfully by young and older pupils, and their teachers, as well as more skilled users. The possibilities of creating without hassle seem to have been in the forefront of the author's mind.

Nothing is too complicated, there is no special language to learn – it is just a question of planning the individual pages that make up your binder and then linking them together.

Using Magpie

Creating a new binder could not be simpler – click Menu on the *Magpie* icon on the icon bar and open the submenu New Binder.

This leads to a Save As dialogue, where you type in the name you want to save the binder under, and then drag the icon display of the directory to where you want the binder stored.

Once the binder has been created, it will be opened at its contents page. All binders have a contents page which shows the sections and the pages in those sections.

In *Magpie*, the contents page shows you how you have organised your work and provides the tools for changing this, such as

adding or removing pages or whole sections. With *MagpiRead*, the contents page shows how the work is organised and allows the reader to quickly turn to a section or a page of interest.

The control panel of the contents page allows you to create, edit and delete sections and pages. This includes a special title page that is displayed when the binder is first run.

Before you can add pages to your binder, you must create a section in which they can appear.

On your first page, *Magpie*'s toolbox appears, providing all the tools needed for manipulating items placed on the page. By clicking the appropriate icon you can add text, draw lines, place frames and add arrows and buttons for turning pages.

There are also icons for moving, re-sizing, and changing items which are on top of each other. Text is written on the page using the Pen icon with the proviso that this is always done within a frame.

The text can be written in any number of styles and colours depending on the number of fonts available.

It is also possible to use text created with *!Edit*, and in true Risc OS style loading into a *Magpie* frame is done by dragging the file into the frame to be used. Certain Risc OS datafiles are understood by *Magpie* and these too can be dragged and pasted into place.

This means that files created with *!Draw* and *!Paint*, or any program that will also output in these standard formats, can be used as illustrations within a *Magpie* application. Digitised pictures are suitable, as are charts and graphs created with *Presenter*.

It is the possibility of adding sound and music that makes *Magpie* rather special. It has its own built-in 'tape recorder' for simple sound sampling linked with a microphone and either the Clares' *Armadeus* sound sampling card or the Armadillo A448 card. With either of these it is possible to create short sections of digitised speech. As well as speech or sound effects, music created with *!Maestro* can be placed on the page ready to be played.

The linking together of pages within a hypermedia system is crucial, and *Magpie* has a range of buttons for this task. The toolbox comes into play and the Button tool is used to create and edit buttons for changing pages and altering the behaviour of items on the page.

As well as button shapes or arrows being defined to turn to the next or previous page, in sequence or to a particular page, buttons can be objects, such as a picture. These can be further set to hide and reveal the object that is hidden until some action is taken by the users – normally clicking the mouse over the item.

It is no use having loads of information stored away in a system like this if you can only access it by looking through the pages. So *Magpie* provides the ability to search for text in the text areas on the pages in a binder.

If the Search icon is chosen from the control panel of the contents page, all the pages in a binder will be searched. But, to search the binder from a certain page onwards, choose the Search option from the page menu.

When a page has been found which contains matching text it will be opened and the Search dialogue will be re-displayed. Choosing NEXT results in the next page containing matching text being looked for.

Unlike some other Archimedes hypermedia applications, *Magpie* uses sophisticated data compression techniques which enable it to hold text and graphics in a fraction of the space required by uncompressed files. This means binders can be considerably longer and more complex too.

Conclusion

Magpie is an outstanding example of true open-ended software. There is no such thing as a typical *Magpie* application – it is an effective tool for a wide range of uses.

It is certainly an excellent presentation system which can link slides of text and graphics together, with the added advantage that it is tree-like in structure and more information on particular topics can be shown if and when necessary.

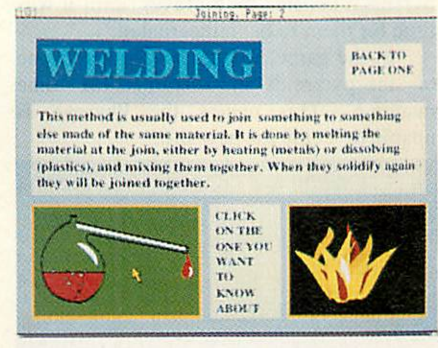
Magpie is ideal for use as a store for free-form information which could not be contained in a traditional database. Charts, digitized photos, pictures and words can be placed alongside each other in whatever way suits you. Many people will of course use it for holding simple reference material about their hobby or interest.

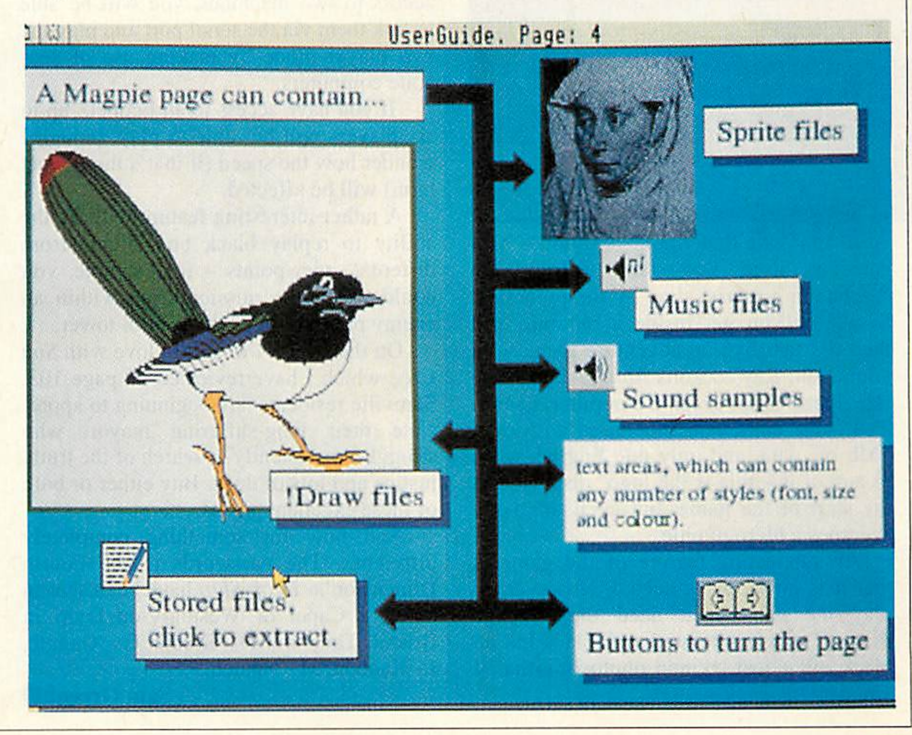
Others will turn to *Magpie* for storing more traditional files such as notes, address lists or personal type records.

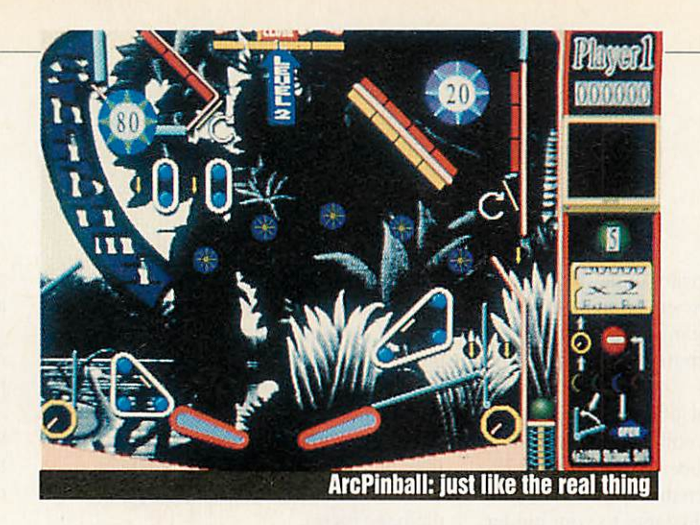
Whatever information you decide to hold within its pages, *Magpie* provides a consistent and friendly environment in which you can build your own system.

Magpie is published by Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ. It costs £39 until March 31 and £54 thereafter.









ArcPinball: just like the real thing

GAME SHOW

One of those few companies boosting the Archimedes with regard to games has just revealed plans of a mega game which will cause the eyes of your Amiga buff friends to turn green. *Tale of the Anubus* is an Egyptian adventure. It is being written by a group of software writers in Norfolk who have invested much time, effort and money into the project, but who don't yet have a company to market it.

The plot is based around pyramids. One of the authors, Ray Maidstone, has always been interested in ancient Egypt and hieroglyphics. He explains: 'The pyramids acted as a sort of time capsule for the Pharoahs. When they died, the pyramids became their graves, until it was time for them to be reincarnated.'

In the game, looters have entered one of the pyramids and disturbed the 'time machine'. This means the Pharoah is unable to begin his new life.



Tactic: fun, but difficult

A bit annoying that, but never mind – you can save him! You start *Tale of the Anubus* in a tourist shop by the pyramids. Somehow you get inside a pyramid and then it's just like an adventure game with animation. Ray reckons *Anubus* is a 'very intelligent visual graphic computer game'. The game comes on four discs with over 7Mb of data, and only one English word in any of it – this is the logo displayed at the start of the game, but even this soon becomes a hieroglyphic.

An interesting feature of the game is that it is not copy protected. However, to play the game you need the 92-page manual, which is printed with black ink on black ink – just try and photocopy that if you can!

The authors have a number of games on the go, including *four* sequels to *Tale of the Anubus* and a 3D space game similar to *Elite*. Availability and price for *Anubus* have not been fixed yet, but expect it in the summer for around £30.

Favourites

Now for a few words on my current two favourite games.

On the Archimedes, *Chocks Away* is still number one in my book, and I'm looking forward to next month when the new missions will be released. If you have access to two machines, you will be able to link them via the serial port and play the two player mode by making use of separate computers.

If you have access to an Econet, up to six players will be able to play, though I wonder how the speed (if that's the correct term) will be affected.

A rather interesting feature will be the ability to replay black box flights from different viewpoints – for example, you could watch the mission from within an enemy plane, or even the control tower.

On the Beeb, I'm still in love with *Sim City*, which I have reviewed on page 103. Samville residents are beginning to appreciate their long-suffering mayor, who struggles persistently in search of the truth, justice and lots of dosh. Buy either or both of these excellent games.

And now for something completely different... The passwords to the Fourth Dimension's *Drop Ship* have been sent in by A J Capel of Westbury-on-Trym in Bristol. They are: D - Dahlia, G - Gaggle, J - Kaunda, M - Nautch.

Sam Greenhill

Iron Lord

Cygnus Soft. Tel: (0533) 559711
Archimedes, £19.95

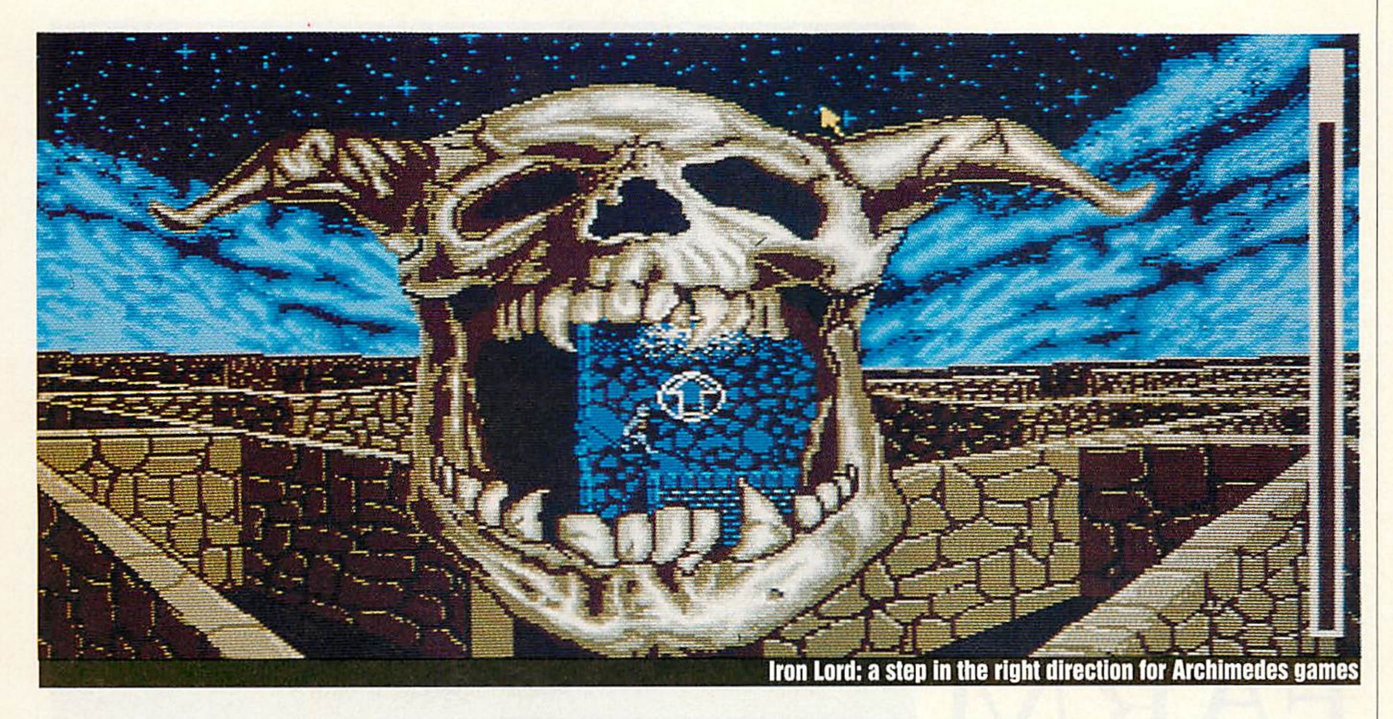
Apart from the *Magnetic Scrolls* conversions, adventure games have been a bit thin on the ground for the Archimedes. This seems set to change with the arrival of *Iron Lord*.

You play the part of the Prince, son of King Tibor, who has been killed by his brother. You must avenge your father by raising an army to defeat the evil forces. By travelling around the kingdom, it's possible to enlist the help of the peasants by winning their trust through prowess in various competitions, such as archery and arm-wrestling. Alternatively, you can undertake quests for characters you meet along the way.

The layout of the game is very similar to the Cinemaware series found on the Atari ST and Commodore Amiga. A graphical map depicts the kingdom, and moving around it is just a case of pointing your horse in the right direction. During transit, a tiny horse runs between locations on the map itself and is also depicted in a little pop-up window as an animated film. Various pieces of medieval music play throughout the game with authentic lutes, mandolins and flugle-horns adding to the atmosphere.

Once your destination has been reached, the view changes accordingly, with an overhead plan-view to the right. You can guide your character around the map, looking in on any interesting buildings.

Every so often, other characters appear in the game. You can, at this point, converse in a limited way by selecting phrases


Iron Lord: a step in the right direction for Archimedes games

from a pre-defined list. It's a shame there is no parser. Objects can be exchanged if they (and money) are available, and they can be used elsewhere in the quest.

The penultimate task is to gather an army to fight your uncle – far beyond the skills of a humble reviewer. The instructions do describe the battle phase as a graphically-controlled war game in which you must control your troops in a strategic and cunning manner.

To round off the game, a jaunt through your uncle's labyrinth to defeat his evil forces must be undertaken. This takes the form of an overhead view of the maze, in a sort of 'gauntlet-style'.

Graphics throughout the game are excellent, even though they're a port from the ST version. The sound adds even more to the medieval setting. Although it's not exactly everybody's cup of tea, *Iron Lord* is a step in the right direction for the Archimedes game library. The combination of adventure, strategy and arcade, gives it that essential long term appeal.

Rob Miller

Tactic

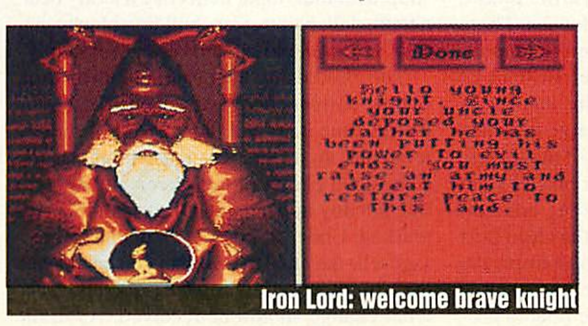
Eterna. Tel: 010-33 6770539
Archimedes, £19.95

Tactic, from Eterna (until recently Sisteme) follows in the footsteps of its last great game, *Ballarena,* in that it's an old idea given a fresh, colourful new face. In this case it's the *Tetris* clones that the 3FR team has given the treatment to. Multi-coloured balls are dropped in from the top of the screen and it's your job to guide them left or right into columns to make up combis. A combi is a combination of balls of the same colour and there are several types from vertical lines of three balls to the fiendishly difficult diagonal line.

To complete a level you must follow the contract on the bottom of the screen. The first contract requires you to make four combis of three ball vertical lines, but from then on the contracts get very demanding. All this is difficult enough without a time limit, but there is one, making *Tactic* a very challenging game. Just try completing a contract of four squares and three diagonal lines in under a minute (and that's only level three!). You've also got to keep an eye out for the bonuses that float around the screen. Some are good, like the next level square, but some are bad. Hit an invisible square and it's game over for you, unless you have a photographic memory!

I have to mention the music – it's the best! Pumped through my stereo at full volume it is far better than some of the rubbish in the music charts these days! The graphics niceties are far too numerous to mention here, but I particularly like the way you can enter your name by rotating the characters around a sphere. This would be a great game if it wasn't so difficult!

Paul James



Iron Lord: welcome brave knight

Arc Pinball

Shibumi Soft. Tel: (0392) 437756
Arc/A3000, £24.95. BBC, £11.95

Arc Pinball is the first games offering to come from Shibumi Soft and it's available for the A3000, Archimedes and BBC/Master machines.

As an original pinball hack, I search for the best games and spend more money than I have on the flashing wonders. So, my first concern is: does *Arc Pinball* compare to the real thing?

If you want a straight answer, yes, astoundingly so. The ball rattles along the chutes, bounces off the bumpers at realistic angles and can at times reach some speed. Flipper control is amazing and I found that many of my poolhall tricks could be replicated, such as stopping the ball dead at full wack.

I cried with joy when I found it had two keys to tilt the table. It does this so well that I can roll the ball back up the slope that leads to the hole!

The main aim of this game is to score points. Knocking down bumpers in a certain combination gives you extras like free balls, big points and a no entry sign over the hole. Lighting the blue pads across the board opens a door and you can shoot the ball up to the bonus table.

I was initially quite disappointed at the lack of a screen designer but, after playing the game for a while, I've come to the conclusion that *Arc Pinball* is my current defininition of plain and simple fun.

Paul James

Realistic graphics are a plus in this simple program

DAVE FUTCHER counts on a simple maths package for younger children

FARM NUMBERS

As more and more BBC A3000s find their way into schools, and parents purchase The Learning Curve for educational support at home, more educational software will be released. Already it is growing. *Farmer Giles* is a collection of four programs intended to support early mathematics work in numbers and money.

According to the opening screen it looks as if the program has been particularly designed to support Mathematics in the National Curriculum. It says that the program's use will support attainment targets 3 and 8, which cover Numbers and Measures.

Despite the package's name there are actually two groups of programs based around the popular farming and shopping themes that all young children seem to love.

In the *Farmer Giles* program, the child has to answer the question about how many cows there are in two of Farmer Giles' fields. The graphics are realistic, with cows placed in grassy fields with gates and fences. There are hedges, trees and a ploughed field making up the background scene. Instead of merely typing in numbers, the answer is entered by clicking one of the large numbers that are displayed at the bottom of the screen.

It then appears in the answer box. If right a little tune is played and if wrong another, less tuneful, sound is heard. If the child fails to get the answer right after two attempts the correct answer is given. The second part of the package is made up of three related programs based around a shopping trip. Two of these are called *How much is?* and are based around the cost of items in a shop and concern the skill of addition. The first involves a single item and the second up to four items. The third money program is called *How much change?* and this is the only program in the pack where subtraction is directly involved.

The shopping programs are based around two different scenerios – a sweet shop and a toy shop. The *How much is?* games are played in a sweet shop with a range of sweets like sherbert, lollies, toffees, chewing gum, sticks of rock, apples and crisps for sale. The program asks the cost of items and the child answers by clicking the large coins displayed at the bottom of the screen, making up the correct amount by clicking several coins if necessary.

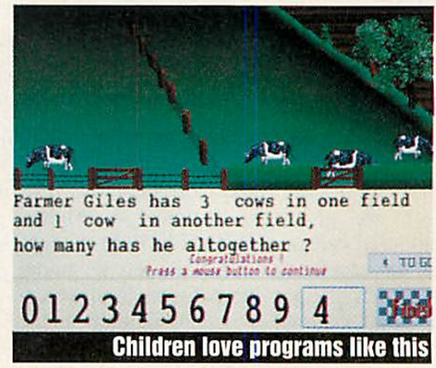
How much change? takes place in a toy shop with individual items like a teddy bear, a train, doll, paints, jeep, building blocks, jigsaw, notepad, pencil and rubber for sale.

The child using the program has to work out the correct change after considering the price of the item and the amount of money tendered. A till display appears at the top right-hand corner of the screen and an item like a teddy appears next to it with its price marked. Under this colourful display a message tells the child the amount you have given the shopkeeper, such as £1.50, and asks what change should be received. As in the *How much is?* programs the answers are given by clicking the coins displayed along the bottom of the screen.

Despite truly colourful scenes and excellent sprites that make for realistic farm sequences and shopping trips, *Farmer Giles* is a pure and simple old fashioned 'drill and practice' program. It has been done well but all the programmer has effectively done is to 'dress up' basic number and money practice. The BBC A3000's graphics potential has been put to good use.

It is my view that, in reality, practice programs like this are a waste of any computer's real power. However, if you want your child to practice simple addition and subtraction of numbers and money with your BBC A3000, this program offers that possibility. Whatever you think educationally, children still love programs like this!

Farmer Giles is published by Computer Tutorial, Semarket Hill, Cowes, Isle of Wight, PO31 7TR. It is available for the BBC A3000 and Archimedes and costs £19.95.



Children love programs like this

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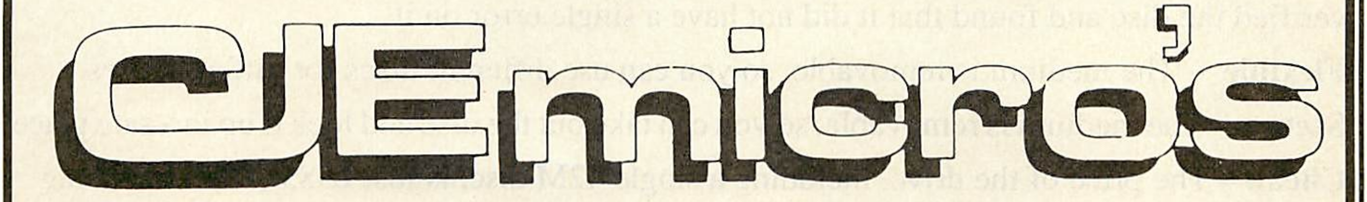
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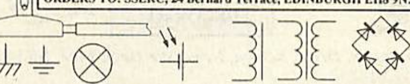
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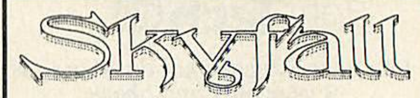
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SOFTWARE SHOWCASE

ACORN USER ADVERTISEMENT PAGES – MARCH 1991

SMOOTH PRESENTATION

The Arc is finding wider use in conference presentations. **PAUL JAMES** visits one company which has perfected the art of the slide show

Have you ever had to endure a post-holiday slide show – you know the one, where the whole family grudgingly gets together while auntie exudes about how wonderful the Isle of Wight was in August? Four hundred slides later you seriously wonder about auntie's presentation skills.

Some companies take a similar approach to conference presentations. When a large company calls a meeting of its executives, it needs to put information across to a captive audience. It is important that all the information is presented in a stylish, informative and interesting way. The show also needs to run smoothly – there is no advantage in projecting a slide showing increasing profits the wrong way up in front of prospective investors!

Nowadays, computers are used to manage presentations and conferences, controlling sophisticated projectors, providing many special effects, and of course, enabling computer generated 'slides' to be projected directly onto a large screen.

One company at the forefront of computerised presentations using the Archimedes is Cadsoft. Based in Aylesford, the company's products are geared towards electronic presentation and revolve around *Maestro Presenter* software.

The powerful hardware nerve centre, called Show Master, comprises: an Archimedes 410 with 4Mb of memory and an Arm 3 upgrade; a 210Mb hard disc drive; a 44Mb removable hard disc; numerous inputs and outputs for add-ons, such as a slide maker and printer; and a 16.7 million colour video board.

Since 1986 the company, run by Michael Flannigan, has been establishing a reputable role in the electronic presentation business.

Michael writes all the software for the machine and, while he doesn't make a big song and dance about an Arc being used, when asked why he doesn't use a more widely known computer, his reply is 'because the Archimedes is better'. He also listens to customers, adding improvements and adjusting the software according to advice.

Not that the Show Master set up isn't very capable already. The video card (Millipede's Prisma 3 graphics board) can hold four very hi-resolution true 256 colour screens – each screen is independent and can be superimposed over the others, allowing special effects like pan, fade and scroll. These are used in conjunction with the software to provide smooth and interesting transitions between 'slides', keeping even the least interested spectator awake. It can manage 44 frames of video animation, known as a 'sting' in the trade.

Before each show, the slides are drawn up and stored on the hard disc. Further storage is provided by the removable hard disc drive. The software allows the user to program the sequence beforehand – for instance, the first few can fade in the company logo, play a jingle and drop in the name of the first speaker.

Each one of these steps has a transitional stage, which could be an amount of time or a keypress, and the type of transition is programmed, whether it be a fade, a cut or a smooth glide onto the screen.

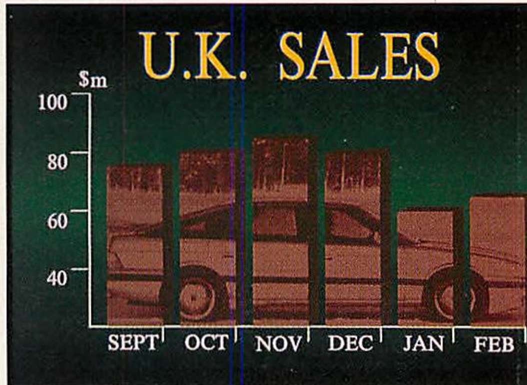
While the screen shows the end product, the person controlling the system can edit the show in real time on a personal monitor, with picons (small pictures) indicating what is coming up.

The screens are created by a mixture of video digitising and caption generation. As well as using Monotype outline fonts, the caption generating software also includes drawing facilities, provided by the Risc OS *!Draw* module. A screen can even include a live image taken with a video camera on the spot. There are also extensive facilities for creating graphs, and data entered in spreadsheet style can be output to a large variety of graph and chart styles to make yet more interesting slides.

At the end of the show, slides can be printed out to a colour printer, or made into standard transparencies so that clients can take them away.

The Show Master has established a reputation for being flexible. It has seen action at a recent Asda/Gateway/Next fashion event and is also used to create links for *Financial Times* television. A system was also taken to Phoenix, Arizona for a major presentation by the Vickers group. Most recently, a system was taken to Japan by a well known pharmaceutical company, only six weeks after it was purchased – indicating the confidence the company had in the Arc-based system, with its user-friendly software and extensive facilities.





Auntie might not be quite in that league yet, but I'm sure she would be impressed...

Further details from Cadsoft Graphics Systems Ltd, Upper Wield, Aylesford, Hants.